NATIONAL INSTITUTES OF HEALTH

OFFICE OF RESEARCH ON WOMEN'S HEALTH

# WOMEN IN BIOMEDICAL CAREERS: DYNAMICS OF CHANGE

## Strategies for the 21st Century

Full Report of the Workshop

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NATIONAL INSTITUTES OF HEALTH

OFFICE OF RESEARCH ON WOMEN'S HEALTH

Office of Minority Health
Resource Center
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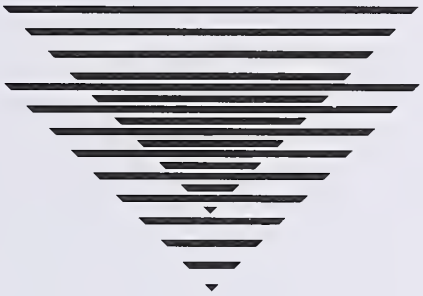
# WOMEN IN BIOMEDICAL CAREERS: DYNAMICS OF CHANGE

## Strategies for the 21st Century



Full Report
of the Workshop

Bethesda Marriott
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VOLUME I

SUMMARY REPORT

CONTENTS

VOLUME I: SUMMARY REPORT

FOREWORD ..... 1
*Ruth L. Kirschstein, M.D.*

PREFACE ..... 3
*Vivian W. Pinn, M.D.*

EXECUTIVE SUMMARY ..... 5

THE STRUGGLE TO GET THERE ..... 18
*Carola Eisenberg, M.D.*

STATUS OF WOMEN IN BIOMEDICAL CAREERS
*(Synopses of Panel Presentations)*
**Recruitment, Retention, and Reentry** ..... 21
*Shirley M. McBay, Ph.D.*
*Linda M. Bartoshuk, Ph.D.*
*Anne Morris Hooke, Ph.D.*
*Luther S. Williams, Ph.D.*

**Advancement and Workplace Climate** ..... 28
*Carol Aschenbrener, M.D.*
*Jane G. Schaller, M.D.*
*Donald R. Mattison, M.D.*
*David M. Brown, M.D.*
*Helen M. Free, D.Sc.*

**Abuses of Power in the Workplace** ..... 39
*Roger J. Bulger, M.D.*
*Lillian Gonzalez-Pardo, M.D.*
*Nancy E. Gary, M.D.*
*Rebecca Vigil-Giron*
*Marjorie P. Wilson, M.D.*

SHAPING THE FUTURE FOR WOMEN IN SCIENCE ..... 49
*Maxine Singer, Ph.D.*

WOMEN IN BIOMEDICAL RESEARCH:
BREAKING THE BARRIERS AND CHANGING THE RULES ..... 55
*Bernadine Healy, M.D.*

GIRLS, SCIENCE, AND THE SCHOOLS ..... 61
*Susan McGee Bailey, Ph.D.*

THE FUTURE OF WOMEN IN HEALTH ..... 67
*Antonia C. Novello, M.D., M.P.H.*

WOMEN IN BIOMEDICAL CAREERS: MINORITY WOMEN'S PERSPECTIVES ..... 71
*Shiriki Kumanyika, Ph.D., M.P.H.*
*Jean King, Ph.D.*
*Dyanne D. Affonso, Ph.D.*
*Helen Rodriguez-Trias, M.D.*
*Linda Burhansstipanov, M.S.Ph., Dr.Ph., C.H.E.S.*

VOLUME II: SUPPLEMENTARY REPORTS

WORKSHOP OVERVIEW ..... 77
*Carola Eisenberg, M.D.*
*Shirley Malcom, Ph.D.*

REPORTS OF THE WORKING GROUPS: STRATEGY DEVELOPMENT SESSIONS

**Education**
Prenatal through Eighth Grade ..... 83
Ninth through Twelfth Grade ..... 87
Undergraduate through Doctoral ..... 91
Undergraduate through Health Professional Degrees ..... 95
Women's Colleges: Their Role in Preparing Women Scientists ..... 99
Reentry and Nontraditional Pathways to Success ..... 105

**Workplace Climate**
Internal Factors that Affect Women—Family Issues, Pay Equity ..... 109
External Factors that Affect Women—Public Images, Stereotypes ..... 113
Tenure and Promotion ..... 117
Harassment in the Workplace ..... 121
Understanding Power ..... 124

CREATIVE DINNER DISCUSSION GROUP REPORTS ..... 127

APPENDICES
Appendix 1: Task Force Roster ..... 151
Appendix 2: Participants ..... 155
Appendix 3: Agenda ..... 167
Appendix 4: Public Hearing Summary ..... 183
Appendix 5: On-Line Access ..... 213

# FOREWORD

## Historical Perspective

*Ruth L. Kirschstein, M.D.*
*Deputy Director*
*National Institutes of Health*

*Director*
*National Institute of General Medical Sciences*
*(1974–1993)*

*Acting Associate Director*
*Office of Research on Women's Health*
*(September 1990–September 1991)*

In 1983, the Assistant Secretary for Health established a Public Health Service (PHS) Task Force on Women's Health Issues (Task Force). One of its principal accomplishments was the publication in 1985 and 1987 of a two-volume report, *Women's Health: Report of the Public Health Service Task Force on Women's Health Issues*,[1] which recommended that "biomedical and behavioral research should be expanded to ensure emphasis on conditions and diseases unique to, or more prevalent in, women in all age groups." Since that time, the issue of women's health in the political, social, and biomedical senses has come a long way. Among the most significant milestones was the creation of a new Office of Research on Women's Health (ORWH) within the Office of the Director of the National Institutes of Health (NIH) in September 1990.

As part of its overall mandate, the ORWH has been charged with three critical objectives. The first objective is to ensure that in the performance of any research supported by the NIH the important issues that pertain to women's health are adequately addressed. These issues relate to diseases, disorders, and conditions that are unique to, more prevalent among or far more serious in women, or for which there are different risk factors or interventions for women than for men. The second objective is to ensure appropriate participation of women in clinical research, particularly in clinical trials. The third objective is to foster the increased enrollment of women in biomedical careers, especially in pivotal decisionmaking roles within both the clinical medicine and the research environments.

The NIH has taken major steps during the past 2 years toward realizing these objectives by providing:

- An expanded formal policy on including women in study populations.
- An Instruction and Information Memorandum to all staff regarding this policy.
- A computerized tracking system to monitor the enrollment of women in clinical trials and epidemiologic studies.
- A formal policy that no PHS grant applications will be accepted unless women are adequately represented in planned clinical research, except in instances for which compelling justification can be provided.
- A study by the Institute of Medicine (IOM) to address the legal and ethical barriers to including women in clinical studies.
- Supplemental funds awarded by the ORWH to other NIH components to augment research initiatives addressing high-priority areas regarding women's health.

### Research Agenda on Women's Health

As one of its most important activities in 1991, the ORWH established an NIH Task Force on Opportunities for Research on Women's Health. This Task Force was charged with assessing the current status of research on women's health, identifying scientific research opportunities and gaps in knowledge, and recommending a comprehensive trans-NIH plan for future directions in research on the health of America's women. Through a series of meetings, a public hearing, and a national workshop, the Task Force generated a research agenda that will guide the direction and funding priorities of research on women's health throughout the next decade. The widest possible scope of opinion about the research agenda was solicited from NIH and from the external scientific and lay communities. Their recommendations constitute the foundation for the NIH-wide research agenda to ensure significant progress against the diseases and disorders that place a particular burden on women.[2]

## Women in Biomedical Careers

To address the issues of recruiting and promoting women in scientific and biomedical careers, the ORWH has developed strategy recommendations to overcome the existing barriers. The ORWH convened a Task Force on the Recruitment, Retention, Reentry, and Advancement of Women in Biomedical Careers to gather information on the issues relevant to the recruitment, retention, and promotion of women in science. Cochaired by an African-American scientist and a Hispanic scientist, the 26-member Task Force was composed of 50 percent ethnic and racial minorities, including African Americans, Native Americans, Asians, Pacific Islanders, and Hispanics; 20 percent of the members were men.

The ORWH held a public hearing March 2-3, 1992, to provide interested organizations with an opportunity to present testimony on the issues of recruitment, retention, reentry, and advancement of women in science. Recommendations from Task Force deliberations and the public hearing testimonies served as the foundation for planning this workshop entitled "Women in Biomedical Careers: Dynamics of Change, Strategies for the 21st Century." The goal of the workshop was to develop an agenda for action. The recommendations and deliberations generated at this workshop will provide a basis for an ORWH strategy to enhance recruitment and promotion of women in science. This document is the product of that workshop.

**References**

1. U.S. Department of Health and Human Services, Public Health Service. Women's health: report of the Public Health Service Task Force on Women's Health Issues. Vol. I. Public Health Report 1985;100(1):73-106. U.S. Department of Health and Human Services, Public Health Service. Women's health: report of the Public Health Service Task Force on Women's Health Issues. Vol. II. Washington, D.C.: U.S. Government Printing Office, October 1987; DHHS publication no. (PHS) 88-50206.

2. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health. Report of the National Institutes of Health: opportunities for research on women's health. Bethesda, Maryland, 1992; NIH publication no. 92-3457.

# PREFACE

*Vivian W. Pinn, M.D.*
*Director*
*Office of Research on Women's Health*

The Office of Research on Women's Health (ORWH) at the National Institutes of Health (NIH) was established as part of an ongoing effort to strengthen and enhance research related to diseases, disorders, and conditions that affect women; to ensure that women are appropriately represented in biomedical and biobehavioral research studies; and to foster the recruitment and promotion of women in biomedical careers.

To address the issue of women in biomedical careers, the ORWH sponsored two critical activities: a public hearing and a workshop, Women in Biomedical Careers: Dynamics of Change, Strategies for the 21st Century. At the public hearing, held March 2–3, 1992, representatives of more than 70 organizations described the issues and barriers that women face when considering a biomedical career. These barriers were grouped into nine major areas identified on pages 8-14 of the Executive Summary. The workshop, convened in Bethesda, Maryland, in June 1992, afforded the opportunity for more than 400 women and men to formulate recommendations for strategies to overcome these barriers.

The workshop provided an opportunity for biomedical professionals to exchange ideas and to develop recommendations and strategies for the recruitment, retention, reentry, and advancement of women in the biomedical sciences. The opening session was composed of a series of panel discussions that highlighted the major barriers that women encounter in biomedical careers. Panelists addressed three topics:

- Recruitment, retention, and reentry.
- Advancement and the workplace climate.
- Abuses of power in the workplace.

Synopses of the panelists' presentations are included in volume I of this report.

Throughout the course of the workshop, keynote speakers addressed the major issues by presenting short talks based on personal experiences and research findings. The talks stimulated participants' thinking and are included in volume I of this report. Also included in volume I is a paper by Drs. Shiriki Kumanyika, Jean King, Dyanne D. Affonso, Linda Burhansstipanov and Helen Rodriguez-Trias on the perspective of minority women in science. This paper was prepared at my request in order to emphasize the particular perspective of our multi-ethnic Task Force and workshop participants and to discuss issues of importance to minority women that were not fully addressed in the general sessions.

Once the panel sessions had been concluded on the opening day of the workshop, participants broke into strategy sessions and creative dinner sessions to develop recommendations for overcoming the barriers to the advancement of women in biomedical careers; 11 working groups met simultaneously during the strategy sessions. Each was charged with the task of summarizing the major issues and barriers relevant to the group's topic and developing recommendations. Subsequently, the recommendations of the 11 reports were merged under 4 topics: education, professional education, reentry and workplace climate, and retention. These reports are summarized in the Executive Summary.

Education

- Prenatal Through Eighth Grade.
- Ninth Through Twelfth Grade.

Professional Education

- Undergraduate Through Doctoral Degrees.
- Undergraduate Through Health Professional Degrees.

- Women's Colleges: Their Role in Preparing Women Scientists.

Reentry and Workplace Climate

- Reentry and Nontraditional Pathways to Success.
- Workplace Climate: Internal Factors that Affect Women—Family Issues, Pay Equity.
- Workplace Climate: External Factors that Affect Women—Public Images, Stereotypes.

Retention

- Tenure and Promotion.
- Understanding Power.
- Harassment in the Workplace.

The 11 full reports that were submitted by the workshop participants and prepared by the cochairs of each working group are included in volume II of this report.

The second type of working session was the creative dinner session during which eight groups met to develop recommendations based on their discussions of the following topics:

- Networking for Graduate Women in Science.
- The Politics Mother Never Taught You.
- Why Not a Women's Health Specialty?
- But We've Always Done It Like This: Challenging the Current Structure.
- Science as a Second Language: Ethnic Issues.
- Women, Research Thyselves: Women Researching Women's Health Issues.
- Building Support Structure—Keeping Your Sanity.
- The "Old Boys Network"—Not for Old Boys Only.

The full reports of the creative dinner session groups are included in volume II of this report.

Volume II contains an overview by the workshop cochairs, Drs. Carola Eisenberg and Shirley Malcom, and summarizes the major themes and issues treated by each working group. Drs. Eisenberg and Malcom provided leadership throughout the planning, implementation, and reporting phases of the public hearing and the workshop. To them we owe appreciation for their guidance and efforts that contributed to the success of the workshop aimed at improving the status of women in biomedical careers. We are grateful for the enthusiastic and informed participation of our Task Force members, speakers, participants, and colleagues at the NIH.

*Women in Biomedical Careers: Dynamics of Change, Strategies for the 21st Century* presents proven and innovative strategies not only for the NIH but also for other institutions, governmental agencies, organizations, and individuals that may successfully overcome the barriers to the recruitment, retention, reentry, and advancement of women in biomedical careers in the 21st century.

## Women in Biomedical Careers: Dynamics of Change, Strategies for the 21st Century

A growing awareness of the specificity of women's health issues—breast cancer, osteoporosis, and heart conditions—has opened the way to examine the role of women in biomedical careers. Are they underrepresented in biomedical careers even if they are trained in proportionate numbers? If not trained in proportionate numbers, what are the barriers that prevent them from pursuing careers as health science professionals, academicians, researchers, and policymakers? These are some of the questions challenging today's scientific community as it strives to achieve an appropriate inclusion of women in all phases of biomedical research, including basic and clinical research, technology transfer, and health services research and evaluation.

Achieving more adequate representation of women within the ranks of the biomedical community requires developing an understanding and awareness of the dimensions of the problem, the barriers women encounter if they choose to pursue a biomedical career, and the benefits that the nation will enjoy when women gain full integration into the culture and leadership of our biomedical institutions.

As reported by the National Science Foundation (NSF) in its study *Women and Minorities in Science and Engineering,* far fewer women than men select careers in the sciences. The women who do select science careers tend to be paid less, promoted less frequently, and experience higher underemployment and unemployment than their male counterparts.[1] The reasons for this disparity are manifold and can be found in the traditional operations of biomedical research institutions and in longstanding, deeply imbedded cultural and social biases.

This report, *Women in Biomedical Careers: Dynamics of Change, Strategies for the 21st Century,* identifies some of the reasons for this situation, indicating barriers that women meet in almost every aspect of their careers. These barriers are apparent in early, secondary, and higher education; entry into the workplace; advancement; salary parity; and reentry into professional situations. The report also provides a synopsis of the issues identified during the March 1992 public hearing on Recruitment, Retention, Reentry, and Advancement of Women in Biomedical Careers and the subsequent recommendations of the working groups that convened during the June 1992 Workshop on Recruitment, Retention, Reentry, and Advancement of Women in Biomedical Careers. In most cases, data substantiating the original findings by the hearing participants and working groups have been updated or supplemented in the Executive Summary to present the most current and useful profiles of women's representation in the biomedical careers field.

*Note—In some cases, data presented in this section are different from those presented in the original working group and dinner session reports because, in the time that has passed since the presentation of these reports, new data have become available. These reports underwent review and revisions with participation and final approval by the cochairs of the respective working groups.*

### Dimensions of the Problem

The barriers to women's professional advancement within the biomedical community, as identified by the public hearing and workshop participants, form a continuum of gender bias in the sciences that begins long before entry into the workplace. The full range of issues concerning women in the sciences are organized into the nine major issue areas discussed in the March 1992 public hearing (see appendix 4 for a summary of the public hearing). Also included within the discussion of each issue area are the recommendations formulated by the working group participants at the June 1992 workshop in the areas of education, advancement in the workplace, salaries, and unemployment and underemployment.

#### *Education*

The cultural and institutional disincentives that begin for many young women in the early years of their scientific training are key determinants in their decisions about whether to pursue a career in science or choose another profession. Often cited reasons for lower achievement in the

sciences by girls in grade school and high school include low achievement expectations by educators, peers, colleagues, nuclear and extended families; bias manifested in curriculum and teaching materials (textbooks and films, among others); and a lack of successful and approachable role models.

- Data from the National Assessment of Educational Progress (NEAP) show gaps in science achievement scores between girls and boys as early as age 9.[2]
- During middle and high school education, adolescent females receive science grades equal to or higher than males, yet their achievement on standardized tests is substantially lower.[3] Educational Testing Service (ETS) scores of 17-year-olds on biology achievement tests show that in 1988 males scored an average 29 points higher than females; a gap of about 65 points was found on physics achievement tests of the same year.[4]
- At the undergraduate level, women earn approximately 46 percent of all baccalaureate degrees in the biological and agricultural sciences.[5] Among these selected degrees, women earn 51.7 percent of general biology degrees, 44.1 percent of biochemistry and biophysics degrees, and 41.3 percent of cell and molecular biology degrees.[6]

The near parity described above is not found at the graduate level, although some progress has been made in the number of women pursuing scientific degrees. The overall percentage of women earning graduate degrees in the biological and agricultural sciences has increased gradually over the past decade by about 1 percent per year, to approximately 43 percent of all degrees.[7] Unfortunately, the distribution of female candidates is still concentrated in professions traditionally perceived as being reserved for women. For example, among female students in health-related fields in 1991, 45.3 percent were concentrated in nursing, and these women accounted for 95 percent of the graduate students in that field.[8]

Despite gains in recent years, women are still underrepresented in health fields more traditionally dominated by men. Among graduate students in 1991, the percentages of women enrolled were 29.6 percent in dentistry, 24.6 percent in biophysics, 42.1 percent in pharmaceutical science, and 40.9 percent in the veterinary sciences.[9] In medical schools, women constitute 38.1 percent of enrolled students and about 36 percent of graduates.[10]

At the doctoral level, women represent only 28 percent of the students in all areas of science and engineering.[11] In the biological and agricultural sciences, women accounted for 34.4 percent of the doctorates earned in 1991.[12]

***Advancement in the Workplace***

Data on the representation by women, particularly members of diverse racial or ethnic groups, in the educational and academic training pipeline indicate a profound diminution of participation, advancement, and pay equity as more academic training, credentials, and experience are required in the workplace. As a result, women comprise smaller percentages at each successive step in the career path in the disciplines traditionally dominated by men and, in particular, in the highest scientific ranks.

- In four-year colleges, women with doctorates in physical sciences, mathematics, computer sciences, environmental sciences, life sciences, psychology, or social sciences held 19 percent of all positions; 31 percent of assistant professorships; 21 percent of associate professorships, and 9 percent of full professorships.[13]
- In the university tenuring process, men generally achieve the rank of full professor in 12 years as compared with 20 years for women. In addition, women are four times less likely than men to achieve this rank during their careers.[14]
- During 1993, women in medical school represented 23.7 percent of all faculty but only 13.6 percent of tenured science faculty and 10.5 percent of tenured clinical faculty.[15] Four of the 126 medical school deans and 114 of 772, or 14.7 percent, of associate deans were women.[16]
- During 1993, 18.8 percent of all dental school faculty were women.[17]
- During 1992 and 1993, among pharmacy faculty, 28.4 percent of all positions were

*Note—The Office of Research on Women's Health wishes to acknowledge the assistance of Janet Bickel, Association of American Medical Colleges; Catherine Didion, Association for Women In Science; Rosalie Sagraves, Pharm.D., University of Oklahoma College of Pharmacy; and Jean Sinkford, D.D.S., Ph.D., American Association of Dental Schools, in compiling the data presented in this section.*

held by women, but women held only 5.6 percent of tenured, full-professor positions.[18] Only 1 out of 66 deans and 3 out of 84 associate deans were women.[19]

*Salaries*

In private, public, and academic sectors, the earnings of female scientists are, on average, lower than those of their male counterparts, beginning with the salaries of recent graduates for 1990.[20] Over their entire career span, female scientists and engineers earn median annual salaries that average 14.9 percent less than their male counterparts with equal years of experience.[21] In the life sciences, the median income of recent female graduates with baccalaureate degrees is 17.3 percent lower than that of recent male graduates.[22] This gap in pay between women and men widens to a differential of 23 percent for recent doctoral graduates.[23]

*Unemployment and Underemployment*

Women who have successfully completed their scientific training and who are actively seeking full-time positions in their specialty or discipline are more likely than men to experience both unemployment and underemployment. Among scientists and engineers in all fields, women seeking full-time employment experience unemployment at nearly three times the rate of men. Women who are employed part-time but seeking full-time positions or who are working in full-time positions outside of their field, experience underemployment more than 2.5 times as frequently as men.[24] In the life sciences, unemployment status data show a slightly better situation for women with unemployment at 2.83 times the rate experienced by men and underemployment at 2.37 times the rate for men.[25]

Without exception, each sector of the biomedical science community reflects inequities in salaries and advancement for women. For example, at the NIH the Task Force on the Status of NIH Intramural Women Scientists released a report in May 1993 that found a pay differential between female and male scientists ranging from 2 to 9 percent.[26] During the past decade, women have constituted an average of 29.5 percent of the NIH postdoctoral trainees but only 18 percent of the NIH tenured scientists.[26]

To help shape policy and determine the amount of funding and its application for programs of research, the Federal Government relies on senior advisory committees that consist primarily of national experts charged with providing independent advice. Unfortunately, these highly visible and prestigious bodies also reflect significant underrepresentation of women.

Senior-level advisory committees, task forces, ad hoc and working groups, among others, review proposals, identify research priorities, and establish funding allocations. At NIH, the peer review panel for research grants has one of the highest proportions of women on any scientific advisory board of the Federal Government. Nevertheless, it has only 392 women compared with 1,268 men.[27]

## The Public Hearing and Working Group Report

The March 1992 public hearing provided the Task Force with input from community and health leaders from across the Nation and identified the barriers responsible for the inequities described below. The issues and recommendations presented at the public hearing fall into nine major areas relevant to women's biomedical careers:

- Recruiting women to biomedical careers.
- Visibility: Role models and mentors.
- Career paths and rewards.
- Reentry into a biomedical career.
- Family responsibilities.
- Sex discrimination and sexual harassment.
- Research initiatives on women's health.
- Gender sensitivity.
- Minority women in science.

Participants in the June 1992 workshop built upon these recommendations and developed strategies for action by NIH and other institutions, organizations, and individuals. At the workshop, 11 working groups met in strategy sessions on the following topics:

Education

- Prenatal Through Eighth Grade.
- Ninth Through Twelfth Grade.

Professional Education

- Undergraduate Through Doctoral Degrees.
- Undergraduate Through Health Professional Degrees.
- Women's Colleges: Their Role in Preparing Women Scientists.

Reentry and Workplace Climate

- Reentry and Nontraditional Pathways to Success.
- Workplace Climate: Internal Factors that Affect Women—Family Issues, Pay Equity.
- Workplace Climate: External Factors that Affect Women—Public Images, Stereotypes.

Retention

- Tenure and Promotion.
- Understanding Power.
- Harassment in the Workplace.

An additional eight groups met in informal sessions to develop recommendations on the following related topics that consider broader societal issues:

- Networking for Graduate Women in Science.
- The Politics Mother Never Taught You.
- Why Not a Women's Health Specialty?
- But We've Always Done It Like This: Challenging the Current Structure.
- Science as a Second Language: Ethnic Issues.
- Women, Research Thyselves: Women Researching Women's Health Issues.
- Building Support Structures—Keeping Your Sanity.
- The "Old Boys Network"—Not for Old Boys Only.

The recommendations of all of these working groups are synthesized in this report as they correlate to each of the nine areas originally identified by the public hearing participants. One important conclusion of all of the working groups was that their recommendations could, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

## Barriers and Recommendations

***Issue 1:***
***Recruiting Women to Biomedical Careers***

Because the training and development of qualified female scientists is a continuum that begins during the formative stages of education, issues that impede the recruitment of women into the sciences must be addressed at their origins. For many girls, the aggregate effect of low expectations by parents and teachers for their performance in math and the sciences, gender-biased textbooks, and gender stereotypes can ultimately result in underachievement and a loss of interest in the sciences.

- Studies have shown that self-confidence in math can be an important determinant of success in the sciences.[2] Data from the ETS suggest that girls' self-perception of lower ability in math begins early and increases with age.[28]
- In high school, young women receive grades at the same level or higher than young men, yet their achievement on science standardized tests is substantially lower.[3]
- Questionnaires completed by young female undergraduates at the City College of the City University of New York revealed that many who were interested in science in high school were later discouraged from pursuing a science career by parents, educators, or counselors.[29]

For young women who demonstrate an interest in and aptitude for science, perceptions of opportunities in the sciences can be critical.

- Many women who pursue the biomedical sciences are not sufficiently encouraged during their training to consider research careers but are directed toward clinical, administrative, or other direct service roles.[30]
- Many women have difficulty perceiving the advantages and rewards of a research career. Women with specific scientific training continue to be rewarded more for their interpersonal skills than for their analytical abilities.[31]

The working groups that addressed the issues of recruitment of women to biomedical careers concurred that strategies must reflect a comprehensive approach to barriers of gender-specific attitudes at home, in the community, and, especially, in the schools. Most important, the strategies should emphasize the importance of providing girls and young women access to role models, special programming, and better curricular components in science.

***Issue 1 Recommendations***

- Externships in scientific workplaces for students to work as laboratory assistants in various capacities should be developed and supported, especially by the NIH, the NSF, and universities.
- Health curricula that emphasize understanding, depth of knowledge, and the interdisciplinary nature of science should be developed in cooperation with local boards of education and universities.
- Studies should be sponsored to document successful science-oriented programs at women's colleges because data indicate that these institutions educate a greater percentage of women who become scientists than coeducational colleges. These studies should be coordinated by such groups as the Women's College Coalition (WCC) and distributed to the administrators at all academic institutions from elementary through postgraduate level.
- Science method courses that use alternative instructional strategies such as cooperative learning should be developed for teachers of precollege students.
- Information about scholarships, internships, and careers in science should be provided for students, teachers, and counselors through appropriate channels such as Federal agencies and foundations.
- Local schools should conduct workshops or orientation sessions for parents and teachers at the beginning of each academic year about career opportunities in mathematics and science.
- Summer fellowships and internship programs in private laboratories, governmental agencies, and institutions of higher education should be instituted and/or expanded for junior and senior high school teachers and college professors to update their science knowledge.
- Professional scientific organizations' information networks should be linked to all schools so counselors have access to data on careers, internships, scholarships, publications, and programs.
- Textbook publishers should incorporate gender sensitivity and women's contributions to the science.
- Efforts to improve and monitor textbook quality and draw attention to textbooks that show negative or biased stereotypes of female scientists should be supported.
- Parental understanding of science and education, including at-home, science-oriented projects or activities should be enhanced by local school boards.
- A national clearinghouse should be established to provide scientists, parent organizations, community groups, and schools with information on science education programs. This clearinghouse should include lists of federally and privately supported scientists who are willing to volunteer to work with children, teachers, and parent groups; relevant university and corporate programs; and resource materials.

***Issue 2:***
***Visibility: Role Models and Mentors***

Role models and mentors play an important part in shaping the motivations of young women. Unfortunately, the underrepresentation of women in the upper ranks of the sciences limits the number of women who are capable of filling these roles. In particular, there are few women to serve as role models for young, female high school students who are making career decisions. This trend changes little from high school through graduate school, where female students report that they often feel isolated[32] and claim that they do not receive the same attention as male students from male teachers.[33]

Mentoring is also a crucial part of the maturation and advancement of any young scientist. Through a mentor, a young scientist makes important contacts that can lead to opportuni-

ties for career advancement. In a 1989 survey of medical students, 94 percent of the women agreed that they needed successful, tenured female faculty members to serve as role models, although only 61 percent actually had mentors and only 11 percent had female mentors.[34]

*Issue 2 Recommendations*

- Mentoring programs at institutions and corporations that include comprehensive orientation and support for novice mentors should be developed.
- Professional organizations should develop media relations departments to identify female experts in science and to maintain ongoing relationships with media personnel in other organizations.
- Short-term science programs for girls that provide hands-on science experience and contact with role models and mentors should be identified and used as models for schools and universities to establish their own programs.
- Individual scientists should be encouraged to develop outreach programs in coordination with schools and universities.
- Media projects for high school students based on women's contributions and their roles in biomedical fields should be developed by local school boards.
- Regional centers for women's health research should be identified or established and be an integral part of local university programs.
- Guidelines on evaluating and choosing mentors should be provided for graduate women; and formal instructions for faculty on mentoring skills should be developed and presented.
- Institutions should make available the criteria used to make decisions on promotions and demystify the process of advancement. Departments should make available to graduate students the curricula vitae of individuals in senior-level positions.
- National graduate networking in conjunction with professional organizations should be created and encouraged.
- Information systems should be developed by Federal agencies such as the U.S. Department of Health and Human Services (DHHS) and the Department of Education (DOE) to facilitate mentoring, networking, and access to information on awards and honors opportunities.

*Issue 3:*
*Career Paths/Rewards*

As the data on salaries and advancement suggest, women are not afforded the same biomedical career opportunities as men. Throughout the biomedical disciplines, women are employed in smaller numbers than men and are disproportionately concentrated in lower or nontenured positions. According to the NSF, the ranks of U.S. scientific faculties include a total of 16,484 female doctoral scientists in the life sciences (biological, agricultural, and medical) or 24 percent of all positions.[35] Within the life sciences, female doctoral scientists are consistently underrepresented in the top ranks of academic institutions.[36]

*Issue 3 Recommendations*

- The exchange program placing NIH female scientists in universities for fixed time periods of 1 to 2 years should be expanded.
- Supplemental slots in training grant applications should be opened to include components for new courses, training in new scientific techniques, and scientific problemsolving for women.
- Career development awards to facilitate the initiation of independent research careers should be offered by a range of institutions, including private industry, Federal agencies, and foundations. Components of these awards should include a feasible research project, a mentor, release time to complete the project, and no age stipulation in eligibility criteria.
- A national awards program should be developed to reward institutions for excellence in recruiting, promoting, and retaining women and for offering reentry programs for women.
- "Survival guides" for junior faculty and graduate students should be provided and regularly updated by school administrators.

- A Women in Biomedical Careers Clearinghouse should be established to provide databases on full- and part-time positions at academic medical centers and hospitals, on qualified candidates and their curricula vitae, and on women in the biomedical fields who hold leadership positions. This clearinghouse should make available national data sheets from Federal agencies such as the NIH and the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC).
- National graduate networking in conjunction with professional organizations should be created and encouraged.
- Shadowing programs in nonacademic settings, especially in private industry and Federal agencies should be established.

***Issue 4:***
***Reentry Into a Biomedical Career***

At present, women who leave their scientific careers to raise families often face significant barriers when reentering the field. Those who have been out of the system for several years often find that their fields have advanced considerably and that research technology has changed. To reenter, these women often need opportunities to become current without having to make an investment in formal instruction at a university. These women also need mentors and an institutional environment that does not view them as "quitters" or as not being serious about a career.

***Issue 4 Recommendations***

- Special research and training awards should be developed by universities for mature female scientists.
- Seminars and regional workshops for female scientists on the "how-to's" of reentering a biomedical career should be developed by Federal agencies and foundations.
- Supplemental awards to research grants that would provide research training to individuals reentering the academic community should be established by agencies and institutions offering these grants.
- Comprehensive programs for women who have followed nontraditional career paths should be developed to integrate them into scientific research programs. These programs should include support systems and incentives for mentors.
- A longitudinal assessment of developmental paths and career success of women in nontraditional/reentry modes should be conducted.

***Issue 5:***
***Family Responsibilities***

During an academic career, meeting the rigorous requirements for tenure tends to coincide with prime childbearing years. This factor can impede women's progress and often forces them to chose between their careers and their families.

The demands placed upon women for the support and care of dependent children are often ignored by biomedical sciences institutions. In some cases, institutions even pose barriers, separate from issues surrounding tenure eligibility, to women who wish to fulfill both their career and family responsibilities. For example, only 18 percent of medical schools provide child care and only 14 percent of residency programs offer part-time or shared residency positions.[37]

The intense research demands of many biomedical degree programs allow little time for the support and care of children. These demands, when combined with the challenges of obtaining competitive research funds, result in forcing many women, especially those with small children, to leave their careers.

***Issue 5 Recommendations***

- Fellowships that include dependent care, monthly stipends, specific laboratory or clinical retraining, and/or dissertation research support should be offered by agencies, institutions, and universities employing female scientists.
- Service payback loans to support students who teach should be provided by the Federal Government.
- Age and time limitations for eligibility for research awards should be eliminated so that women are not penalized for taking parental leave.

*Issue 6:*
***Sex Discrimination and Sexual Harassment***
Discriminatory practices toward women can be classified as any form of differential treatment based on gender that is detrimental to career development, including practices that exclude women from opportunities, result in lower salaries, or lead to unfair assessments of their work. Sexual harassment includes sexual advances or sexually oriented remarks. Both of these factors can have a negative impact on women, society, and the integrity of biomedical science.

***Issue 6 Recommendations***

- Gender bias in print, radio, and television advertising should be monitored by the Federal Government and reported to policymakers.
- Positive information about women in biomedical careers and the rewards of such careers should be provided by the media for girls and women of all ages.
- Seminars and training modules on sexual harassment, racism, and sexism should be offered by agencies, institutions, and universities.
- Adequate institutional mechanisms for addressing issues of gender discrimination and sexual harassment should be available to all women.

*Issue 7:*
***Research Initiatives on Women's Health***
The enlistment and promotion of women in biomedical research is directly linked to the conduct of research on women's health issues. From a practical standpoint, the full integration of women into the culture and leadership of our biomedical institutions is the best means of ensuring that research at these institutions is attentive, adequately focused, and fully sensitive to the health needs of women.

***Issue 7 Recommendations***

- Panels of consultants from women's colleges should be established to help coeducational institutions adapt and implement female-centered programs.
- The number of female scientist reviewers in study sections and the number of female chairs of study sections should be substantially increased.
- Funds should be set aside for research conducted by women.
- Loan forgiveness programs for researchers in women's health should be encouraged by the Federal Government.
- Research proposals in areas that are relevant to women's health issues should be encouraged by foundations, universities, Federal agencies, and other funding sources.
- Research should be conducted to identify, collect, and analyze what is currently known about health issues as they pertain specifically to women and to determine the appropriateness of establishing a biomedical specialty in women's health.

*Issue 8:*
***Gender Sensitivity***
The workplace environment must be adapted so that women in biomedical careers are respected and acknowledged for their work and contributions, science as a career is both attractive to and feasible for women, and women and men function effectively in this environment without sacrificing their personal responsibilities. Integral to establishing this environment is leadership within the scientific community that is responsive to women's issues and accountable for the development and implementation of effective strategies to address these issues.

***Issue 8 Recommendations***

- Policies that sustain an environment free of gender inequities should be developed and publicized by institutions. This can be accomplished by addressing the following issues:
  - Parental leave and dependent care.
  - Inflexibility of the tenure process.
  - Promotion criteria.
  - Salary equity.
  - Harassment and grievance.

- Annual career evaluation.
- Career orientation and development.
- Flexibility in work schedules.
- Women in leadership positions.
- Community donations for education equipment/supplies.

- An administrative structure should be established at each university for formal mentoring, support groups, and education programs on cultural and gender competencies.
- Programs to develop women's management skills and other career advancement skills should be offered at all institutions.
- Possible partnerships with the Human Resource Development Program in the Directorate for Education and Human Resources of the NSF should be explored.
- Criteria for evaluating institutions on thcir support for reentering women and for women who have followed nontraditional career paths should be identified. Institutions with a good track record should be recognized and rewarded.

***Issue 9:***
***Minority Women in Science***

The recruitment and retention of minority women present a double set of issues: the issues of sexism encountered by women in a male-dominated system and the issues generated by racial and ethnic prejudices. In gender-related issues, minority women experience the same barriers as white women but often to a far greater degree. Minority women have been kept out of science careers by barriers to academic achievement, including access, equity, excellence in educational curriculum, academic services, financial assistance, and a scarcity of mentors. Table 1 (see page 17) presents the most recent data (1993) for various ethnic groups.

Where sexism is absent, minority women must still often contend with issues of prejudice from both genders and even from other racial or ethnic minority groups. Recognition of the special complexity of issues for minority women is the first step toward overcoming the barriers that exist for them in biomedical careers. Application of that knowledge conceptually and pragmatically is the second step. For example, in training female scientists to mentor other female scientists, special attention must be paid to training impartial mentors for minority women.

Fostering special opportunities and visibility for minority women is the third important step in overcoming the double barriers. For example, faculty exchanges in the form of visiting lectureships and membership on institutional advisory boards and committees are ways to increase the visibility and influence of minority women.

***Issue 9 Recommendations***

- Required courses that focus on issues of race, class, ethnicity, and gender should be developed to dispel prevailing stereotypes of scientists and should be implemented for students and faculty by schools and universities.
- Ethnically and culturally diverse books and videos featuring women in biomedical careers should be developed by foundations, Federal agencies, and universities.

In addition to the recommendations detailed in the nine major areas, a series of specific recommendations that address the issue of minority women in biomedical careers were identified by Drs. Shiriki Kumanyika, Jean King, Dyanne Affonso, Linda Burhansstipanov, and Helen Rodriguez-Trias in their chapter, *Minority Women's Perspectives*. Following is a summary of these recommendations.

- Trustworthy mentoring and guidance should be provided to help minority women achieve solid footing in an environment where they are in two important pools for faculty recruitment—race/ethnicity and gender—and may, therefore, be susceptible to both positive and negative market forces.
- Clear institutional policies should be implemented to prevent minority women from the threat of having an inappropriately large load of service activities (formal and informal).
- To the extent that excess visibility and expectations will unavoidably apply to minority women in predominantly white institutions, these should be codified so that resources to facilitate meeting these commitments can be provided (e.g., adequate salary, support staff, study leaves or teaching release time, funds to attend and

present at meetings of both minority- and female-oriented scientific or academic societies, as well as mainstream societies).

- Affirmative action policies should not assume that women and minorities are interchangeable for affirmative action purposes.
- Early appointment of minority research faculty into administrative roles should be approached with full consideration of the possible disadvantages to the faculty member in question and to the field (e.g., insufficient time for teaching or research, increased visibility for any difficulties or failure).
- Minority women should not be stereotyped according to their views and needs as they relate to the balance between racial/ethnic and gender issues or according to their willingness to provide service in these areas. Nonthreatening opportunities for minority women to express their professional needs and preferences in this regard should be offered and these preferences should be respected.
- Full use of special programs to include other minority female or male scientists in the academic environment should be made, particularly where minority women are isolated on a predominantly white faculty.
- Postdoctoral programs or other mechanisms should be used to support minority female faculty development in ways that do not penalize them regarding the tenure clock and serve as a route to eventual tenure.
- Statistics that document progress and equity, or lack of it, should be collected separately for minority female faculty members to support the need for special programs and policies.
- The pathway to promotion and tenure for all faculty should be clarified.

### The Next Steps at ORWH

The Task Force also recommended that the ORWH make every effort to promote the priorities and strategies outlined above to boards of trustees of major universities and major corporations with the hope of creating a productive and useful partnership.

While awaiting the recommendations contained in this paper, the NIH and the ORWH have implemented numerous actions to improve the opportunities for women in biomedical careers. To provide mechanisms for training women who want a biomedical career, the ORWH has funded training grants and fellowships for female scientists and is supplementing recruitment and educational efforts in cooperation with other NIH offices. Intramural examples include:

- The Intramural Reentry Into Biomedical Careers Program established in the Office of Education to afford research scientists an opportunity to reenter research careers in laboratories at the NIH.
- The High School Biomedical Research Program, which provides local high school students with seven Saturday sessions in molecular biology.
- The Intramural Laboratory Science Academy and Preservice/Inservice Teacher Academy, which brings high school students into contact with NIH scientists on the NIH campus for 8 weeks during the summer.
- The Undergraduate Summer Program, which enables nine undergraduate female students to participate in research projects in NIH laboratories.

To encourage reentry extramurally, the ORWH has awarded reentry grants to supplement existing NIH research grants to enable principal investigators to support reentering scientists for full- or part-time research experiences. Other examples include:

- The National Science Enrichment Program, which provides opportunities for high school students from underrepresented minorities and underserved groups around the country.
- The Extramural Reentry Program, which resulted in the placement of a total of 15 researchers who had left their research careers at institutions across the United States.

## Intramural

In addition to these efforts, a special NIH committee has collected data on the status of female intramural scientists at the NIH in order to identify obstacles to women's advancement and to generate recommendations for improved opportunities. One preliminary proposal under consideration by the committee is to nominate a female scientist advisor for each of the Institute Scientific Directors, all of whom are men. These efforts are intended to raise awareness at the highest levels of the NIH scientific community about the problems and issues specific to female intramural scientists.

In addition, the NIH has moved to increase the membership of women and minorities on all NIH committees. As a result of these efforts, representation of women has already increased from 24.8 percent in 1991 to 28.6 percent in 1992. The NIH Office of Equal Opportunity (OEO) has been charged with conducting a survey to assess the nature and extent of sexual harassment and other gender-related discrimination toward women at the NIH.

In the intramural program, women's representation in tenure-track scientific positions has grown from 28.5 percent in 1985 to 33 percent in 1990. The number of women in the Senior Executive and Scientific Services has increased from 14 to 21.

The ORWH is challenging the barriers by providing leadership, opportunities, and incentives to women and institutions. The ORWH is currently reviewing all of the recommendations from the workshop to determine what more it can do to provide leadership and heighten women's awareness about opportunities in the biomedical sciences.

Many of the institutions in the biomedical sciences can do more to foster gender equity in their employees' attitudes, and behaviors and to encourage women to continue in their biomedical careers. Ultimately, each woman's success in a biomedical career rests upon the development of her abilities and her commitment to excellence. Each professional, to advance personally and to advance opportunities for other women, must insist on equity. Institutions are responsible for making policies that protect employees against discrimination, but only the individuals within those institutions can ensure that effective policies are implemented. To improve the professional situation of women in biomedical careers, social attitudes as well as institutional policies must change and that change must be inspired and demanded by individuals. The ORWH invites each individual, each institution, and each organization to consider these recommendations and to join in the challenge of advancing the opportunities for women in science and in biomedical careers.

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**21.** NSF 92-303. Table 73 (calculated based on median annual salary differences in all categories for which values were reported for both men and women. Year: 1989).

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**23.** NSF 92-303. Table 25.

**24.** NSF 92-303. Table 22.

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**Table 1. Distribution of Women U.S. Medical School Faculty by Degree and Ethnicity**

| Women | MD | | PhD/OHD* | | MD-PhD/MD-OHD* | | Other+ | |
|---|---|---|---|---|---|---|---|---|
| Ethnicity | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Native American | 8 | 0.0 | 6 | 0.0 | 1 | 0.0 | 8 | 0.1 |
| Asian | 987 | 2.2 | 338 | 2.0 | 88 | 2.2 | 141 | 2.3 |
| Black | 430 | 1.0 | 85 | 0.4 | 6 | 0.1 | 130 | 2.1 |
| Mexican- American | 43 | 0.1 | 11 | 0.1 | 0 | 0.0 | 10 | 0.2 |
| Puerto Rican | 160 | 0.4 | 24 | 0.1 | 1 | 0.0 | 18 | 0.3 |
| Other Hispanic | 165 | 0.4 | 73 | 0.4 | 5 | 0.1 | 47 | 0.8 |
| White | 6,789 | 15.2 | 4,086 | 20.9 | 347 | 8.5 | 2,316 | 37.2 |
| Refused ■ | 229 | 0.5 | 132 | 0.7 | 8 | 0.2 | 35 | 0.6 |
| Missing | 388 | 0.9 | 159 | 0.8 | 11 | 0.3 | 307 | 4.9 |
| **Total** | **9,199** | **20.7** | **4,914** | **25.4** | **467** | **11.4** | **3,012** | **48.5** |

*OHD: Other health doctorate.

+Other: Faculty with nondoctoral/no degree or missing degree data.

■Declined to respond.

Source: Association of American Medical Colleges. U.S. Medical School Faculty 1993, Faculty Roster System, Washington, DC, 1993.

# THE STRUGGLE TO GET THERE

*Carola Eisenberg, M.D.*

In 1990, in the introduction of the United Nation's report *The World's Women 1970-1990: Trends and Statistics*,[1] the then-Secretary General of the United Nations, Javier Perez de Cuellar, wrote: "Although there have been some improvements for women over the past 20 years, the majority still lags far behind men in power, wealth, and opportunity." That is not news to us: If we did not know it, we would not have come here today.

We are here to work for change. Our assignment is to identify what works and what might work if it is given half a chance. We are looking for proposals for the short term and proposals for the long term.

This meeting is unique, and it is happening because, for the first time, a woman, an outstanding woman, Dr. Bernardine Healy, is the director of the NIH.* It is not an insult to Dr. Healy to point out that she is not the first woman to have had the job qualifications for the position of director, but she *is* the first one to be appointed in the history of NIH. How did her appointment come about? The answer is clear: The women's movement made it impossible for Federal Government officials to ignore the best person for the job simply because she is a woman.

Once appointed, Dr. Healy set out to remedy the neglect of women's health and the barriers that prevent women from contributing in full measure to biomedical research. Her efforts led to the appointment of Dr. Vivian Pinn as the first full-time director of the ORWH. Dr. Healy and Dr. Pinn cannot do the job by themselves. It is up to us to keep the ball rolling.

I have two points to make: (1) We have come a long way from where we were, and (2) we still have a long way to go, but we will get there. Let us begin by recalling the accomplishments of our predecessors. The playing field was not level when they started; it still is not. The difference is that the grade is not as steep as it was.

In the second half of the 19th century, extraordinary women of great talent were haunted by self-doubt. Martha Carey Thomas, later to be President of Bryn Mawr College, wrote these words about her childhood years:

> "Could [it] be really true, as everyone thought, that boys were cleverer than girls[?]. . . I remember often praying about it, and begging God that if it were true that, because I was a girl, I could not successfully master Greek, and go to college and understand things, to kill me at once, as I could not bear to live in such an unjust world."[2]

She did master Greek and took a liberal arts degree at Cornell. Even so, she was refused admission to The Johns Hopkins University doctoral program—the only one in the country at that time—even though her father was a Hopkins' trustee. She had to go to Leipzig and Zurich for graduate study.

Yet, a decade later, The Johns Hopkins University School of Medicine admitted three women to its first class in 1893 and eight to its second. The news was electric. The great American physician, Mary Putnam Jacobi, who had taken her own degree at the University of Paris, wrote: "The hat has gone out from Baltimore that it is not immodest for women to study anatomy and physiology together with men."[2] Elizabeth Blackwell, who had managed to graduate from Western Reserve before it ended its brief experiment with coeducation, hailed the move by stating that "When a college of the standing of Johns Hopkins received women on equal terms, we felt a giant step in advance had been taken."[3] How did it happen?

In the late 1880's, Johns Hopkins faced a crisis. The trustees were short of the endowment needed to open its medical school on time. Four Quaker women, Martha Carey Thomas, Mary Elizabeth Garrett, Mary Gwinn, and Elizabeth

*Dr. Healy served as NIH director from April 1991 to June 1993.

King, offered the trustees the funds they needed on the condition that women be accepted into the new medical school on the same terms as men. The gift carried the proviso that:

> "This sum . . . shall revert . . . if it can at any time be shown by proper legal proceedings that the women studying in the Medical School do not enjoy all its advantages on the same terms as men . . ."[4]

Despite their high regard for the moral character of the Hopkins' trustees (their fathers, brothers, and friends), these gentlewomen exacted a legal pledge. Misses Garrett and Thomas also insisted that *all* accepted students must have a baccalaureate degree and a reading knowledge of French and German. The Hopkins faculty was alarmed; they feared they would not find enough qualified applicants. The women were adamant; the faculty gave in. The requirements for admission to the new medical school in Baltimore made medicine in America a graduate subject for the first time.

Women were admitted and new standards were set, all through the shrewdness of Martha Carey Thomas and her friends. These well-mannered, properly polite but tough women did not leave matters to good will; they made it a matter of law. Furthermore, the struggle for women's rights benefited men no less than women by upgrading the level of medical education for all.

There are now enough of us in biomedicine that, together with those men who understand the justice of our claim, we constitute a majority. For those who want things spelled out, let me explain my arithmetic. On the average, first-year classes of American medical schools are made up of about 40 percent of women. As a conservative estimate, I judge that at least one-third of the young men in each new class are entirely our allies. Voila! Add one-third of 60 percent (the men in the class) to 40 percent (the women in the class) and we have at least 60 percent of the upcoming generation of physicians committed to equal rights for women! Count on it: We will drag the professors, for all their kicking and screaming, into the 21st century!

If we almost have it made at the level of admissions, we have a long way to go when it comes to senior positions. In the past two decades, the percentage of women in the first-year class has risen from less than 10 percent to almost 40 percent; yet, less than 8 percent of full professors, less than 4 percent of department chairs, and a fraction of 1 percent of deans are women. We and our allies have a job ahead of us.

We must see to it that every medical school sets targets to increase the number of women in senior positions. Every faculty council must develop the means to monitor what has and has not been achieved in a given year and report back to the faculty on additional steps necessary to meet the goal. Medical schools with no vacancies for new positions should be enjoined to raise additional funds *and* to hold each position vacated by resignation or retirement until search committees have identified appropriate, tenurable women. At the outset, such efforts are best concentrated in specialties that have the highest percentage of women in their professional pools, fields such as pathology, microbiology, pediatrics, psychiatry, obstetrics, and family practice.

Given the evidence that women are moving up the academic ladder at a rate much slower than that for men, we must take steps to facilitate the career development of women in biomedicine. Every school must provide adequate day care for faculty and staff children. Every school must guarantee leave for childbearing and childrearing for a period of up to 1 year with options for part-time work on return. The months and years women (or men, if they are enlightened) devote to child care should be subtracted from the tenure clock. The credentials of women on the junior faculty should be reviewed annually by a school-wide committee charged with the responsibility of calling those women who appear eligible for promotion to the attention of department chairs; the charge to the school-wide committee should obligate each department chair to explain the action, or inaction, taken in response to the notice and the reasons for it.

Because a funny thing happens on the way to the academic forum (women are lost to the pipeline), we need measures to encourage women to stay with it and to reenter if they dropout. One such measure is the creation of more shared residency positions for those who want to devote additional time to their families. Another is the creation of special clinical and research training programs to "retread" women who have taken time off for child care. We need support groups and mentors for medical students and residents

to provide guidance for academic careers. Discussion of the agonies and the ecstacies of dual career marriages must be frank and open; young women need to understand the options open to them and the price to be paid for each. Most of all, every medical school department must have in place a mechanism to identify talented medical students and house officers and to help them with career planning. This is precisely what is available now for men; it must be extended to women.

This set of proposals is no more than a sampling of ideas; the summary of the workshop demands close reading. What it cannot convey is the enthusiasm, the elan, and the spirit that have characterized the meeting. The message is clear. We are not petitioning for charity. We insist on our human rights.

Our insistence is not for ourselves alone, although we will be the better for it. The fundamental justification for our demands—and the one that will assure our success—is that equal rights for women are fundamental to improving human health. The problems medicine faces are too large to solve with only half the brains in the world at work on them. Real solutions demand coordinated efforts by women *and* by men. I am confident male colleagues who care about academic quality will join us in this call for action because achieving excellence demands all the talent universities can find. Ignoring the talent of half the human race assures mediocrity.

This is an exciting time for women's rights. The male candidates who were swept away in the California primary understood why they lost. Lieutenant Governor Leo McCarthy said: "I got caught in a tidal wave without a surfboard." Congressman Mel Levine said: "This is clearly the year of the woman. There is a tidal wave out there." Women made that tidal wave. What we have accomplished in politics we can do in scientific research. Ladies, get out your surfboards. We are going to ride that tidal wave until gender is no longer a criterion for any job except being a mother.

Answers to important challenges have never come easily. The great American abolitionist, Frederick Douglass, understood that when he stated: "Without struggle, there can be no progress."

Welcome to that struggle!

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## Barriers to Attracting Women to Science

*Panel Presenter:*
*Shirley M. McBay, Ph.D.*

Although significant progress has been made during the past 10 years, there are at least four reasons to remain concerned about the underparticipation of women in biomedical fields. *First*, underparticipation prevents women from engaging in the formulation of policies and decisions that affect the future direction of science and scientific research. These policies and decisions are made by male-dominated congressional committees, Federal and state agencies, and business and industry boards. Underparticipation prevents women from providing leadership and perspective on science-based discussions and decisions that take place at the local and national levels and affect women and their families. *Second*, we should be concerned for economic reasons. Women constitute more than 50 percent of our population and 44 percent of our work force; our economy is increasingly based on science and technology and requires a well-trained work force made up of women and men to operate effectively. *Third*, the number of women attaining degrees in certain science and engineering fields has recently leveled off. *Fourth*, far too many female students are being taught by individuals who do not welcome women into the sciences.

There is no mystery about what it takes to increase the participation of girls and women in the sciences:

- Family support and involvement.
- Early intervention.
- Early success in math and science.
- Hands-on experience in science.
- A rigorous core curriculum.
- Highly qualified, caring teachers and mentors.
- Innovative teaching strategies.
- A supportive learning and work environment that conveys high expectations and fosters curiosity, creativity, and confidence.
- Financial support.

In other words, the recipe is the same as that for success by male students.

Why aren't women entering the sciences in sufficient numbers?

- Parents and teachers of girls too often have not nurtured scientific curiosity in them as young children nor have they provided them with adequate opportunities for developing an early interest in science and mathematics.
- For many children and youth, living in poverty, with its focus on survival, quells their natural excitement about learning.
- Gender differences in achievement in mathematics begin to appear in middle school and in science as early as in elementary school.
- Performance in mathematics is the indicator most frequently used by schools to project academic success and to filter students out of rigorous and more advanced mathematics and science courses.
- In high school, girls take fewer years of mathematics and science and are not as likely to be enrolled in advanced courses in these subjects as are boys.
- Minority youth, including girls, often face the additional barrier of being placed in remedial and low-level mathematics courses, thereby severely reducing their chances of enrolling in advanced mathematics and science courses.
- Low expectations by significant others (teachers, parents, and peers) and the lack of early, successful, and reinforced experiences in mathematics and science prevent girls and minority boys from developing and pursuing interests in the sciences.

- Graduate female students and young female professionals report feeling that being a women makes it more difficult to establish mentoring relationships with male professors and supervisors. In fact, some female graduate students say that they often present themselves as "rough and tough" to prevent unwelcome advances, but realize that by doing so they increase their isolation.

The role of mentoring is viewed as so critical to the development of scientists and engineers that many have called for the development of written guidelines on how to be a successful mentor. Governmental agencies, such as the Department of Education or the Department of Health and Human Services' Bureau of Health Professions, or an outside funding source should commission a paper on mentoring guidelines and make it available to academic institutions, student groups, professional societies, and principal investigators on grants and contracts.

Team work and small working groups are essential for success in science. Women must be welcomed into these groups and be provided with the opportunity to interact with peers in an environment that fosters mutual respect and recognition. This participation is of critical importance because too many talented students are failing to complete their science degrees and too many women are feeling isolated at school and in the workplace. To accommodate women who wish to have families or who are ready to reenter their chosen fields, family leave policies and flexible work schedules are necessary. Finally, academia must make tenure-track positions available to women, and they must do what is necessary to ensure that women are supported in their departments and are treated fairly on issues of promotion, salary increases, and tenure.

## Recruiting Women to Yale

*Panel Presenter:*
*Linda M. Bartoshuk, Ph.D.*

I am going to tell you about a social experiment at Yale University. Yale has a lot of parts, and you are going to be stunned when you look at the number of faculty in these different parts: music, architecture, art, forestry and environmental studies, divinity, organizational management, law, and nursing. There are very few women in most of these sections of the university, but what is really important is that on the faculties of arts and sciences and the medical school where most of the faculty is concentrated, the numbers of female faculty members are dismal, except in the School of Nursing.

I am going to track women from undergraduate school through medical school. Female undergraduates make up about 45 percent of the pool; as graduate students and medical students, they constitute about 35 percent. But now, as they move up to untenured faculty, we start to see the picture we know so well; the numbers start to drop. Move to tenured faculty and the numbers drop even further. Move to department chairs and there is one woman who chairs a department in the medical school. Currently, no women chair departments on the faculty of arts and sciences. Fortunately, come July 1, 1992, Yale is going to have a woman provost, Dr. Judith Rodin.

These comparisons make the faculties of arts and sciences and the medical school look as if they are alike, but they are not. During the past 20 years, the faculty of arts and sciences has been shrinking. The total number of men is decreasing and the total number of women is increasing. The medical school, on the other hand, is expanding, and the numbers of women and the men appear to be expanding at about the same rate. Look at the opportunity here: All we have to do is go out there and do a better job recruiting women.

The faculty of arts and sciences is faced with a tremendous problem because it is shrinking. We had to use special, innovative ideas to get women into the ranks on the faculty of arts and sciences. The first thing we did was to produce a report called the *Caruther's Report* in 1983. In 1968, there were 16 committees that met and dealt with the status of women. Each one said, "We don't have enough. We need more." The *Caruther's Report* essentially said, "Let's do something about it. Let's not talk. Let's do something about it." This report listed a whole series of recommendations, many of them ordinary—one was dynamite. The ordinary recommendations included: "Let's invite more distinguished women to Yale and make them visible." "Let's make the chairs talk to the provost every year about every nontenured woman in their department." "Let's make the chair talk to the women about their career prospects." "Let's improve child care at Yale." "Let's improve employment opportunities for spouses because it is hard to get people to come to New Haven." "Let's get part-time ladder appointments." "Let's get shared ladder appointments." "Let's slow the tenure track to accommodate parental leave time." We did all that.

But here is the dynamite recommendation. That committee dared to say that we want the number of tenured women to *double* by 1990. Nobody had ever said anything like that before, and nobody believed for a minute anybody would do anything about it.

President Bartlett A. Giamatti absolutely endorsed all of the recommendations, including the recommendation to double the number of tenured women by 1990. We were stunned. He gave it a lot of publicity. The goal was achieved, a year early.

How did the Yale administration do it? They did it in part by implementing recommendations contained in the *Caruther's Report*, but, most important, they gave the provosts slots and money to hang in front of the noses of the chairs to encourage them to compete for those positions. The chairs were told that if they could identify outstanding women, either in their departments or from outside Yale, who could be enticed to come to Yale they could have additional resources

provided by the provost's office. The provost would make available the opportunity to borrow slots against retirements. Suppose you have someone who is going to retire in 5 years and you want to use the slot now, you can borrow it and the provost will help you pay the difference in having two salaries over that 5-year period. You also can cash in junior slots and get a tenured slot. Best of all, for the lucky chairs who hit the jackpot, they were allowed to have an incremental slot and money to help pay for it.

What chair on the face of this earth would not go for that reward? Every chair wants more—more slots, more money—so the enticements worked. When you add incremental resources, you do not create resentment in the people who have an expectation of being promoted in the usual ranks at Yale, but you do create an opportunity to get more women on board. It really does work. Since the *James Report*, we have added minority faculty to these concerns.

Now, what have we done in the medical school? Although the medical school is growing, the data suggest that nothing special has happened there. We are simply recruiting women just like we recruit men; we have been doing that for the last 20 years.

Well, the women in the medical school did get together and produced the *Boyer Report* in 1988 and made a pledge for a goal as well. Think what would happen if we were to use the same unusual incentives in the medical school that we had operating in the arts and science faculty. We could do much, much better.

What do we know about salaries in the medical school? Women are being paid less at every rank. To correct that situation you must have commitment from the top, and it has to be a very public commitment and a very real one. You need to identify administrative officials whose job it is to watch the situation and to make things better for women and minorities. It is an important principle of behavior that if you assign a task to someone they do it. You must assign a task to look out for women and minorities, and get them on board. Get the facts. If you do not have access to data in your institution, get access to it.

It is very important in doing this to identify people who have the responsibility to do these things in the community. We have standing committees at Yale, among them the Status of Women Committee in the medical school. We have sexual harassment boards. We also have the Office for Women in Medicine.

Finally, women give a lot of money to universities. Every time you write that check, why not include a note saying, "I would like to see more women on the faculty."

## Reentry Initiatives

*Panel Presenter:*
*Anne Morris Hooke, Ph.D.*

Several studies have indicated that a significant number of women leave science at the bachelor of science, master of science, doctoral, and postdoctoral degree levels because of family obligations. The physical burdens and responsibilities of bearing and raising children inevitably fall more heavily on women than on men. If they leave the field for even a few years, women find it virtually impossible to return—their theoretical knowledge is out-of-date, their laboratory skills have rusted, and they have no experience with the latest techniques or instrumentation. Also, their commitment to science is considered suspect by some in the established scientific community.

Programs designed to bring women already trained in basic scientific principles back into the work force could increase the number of women in science in the shortest time and at the least cost. Women who might be considered eligible for participation in reentry programs could be classified in four groups, and the curricula of the programs could be tailored accordingly. First, women with bachelor of science (B.S.) or master of science (M.S.) degrees who have been out of school for 5 or more years and who wish to return to school for advanced degrees could probably enter the regular graduate curriculum after some bridging or refresher courses. Second, for women with B.S. or M.S. degrees who have been out of the work force for 5 or more years and who simply want to return to biomedical research, a focused curriculum could bring them "up-to-speed." It should not be necessary for them to go back to basic chemistry and biology, but they would need refresher courses before entering advanced classes. An intensive laboratory component would bring them up-to-date with new instrumentation and techniques. Third, women with Ph.D. degrees who have been out of school or the work force for 5 or more years and want to return to research would also probably require a special curriculum designed to bring them "up-to-speed" and, again, a heavy laboratory instruction component. Finally, women with Ph.D. degrees who have been underemployed continuously since graduation in nontenure track and research associate positions and who have perhaps succumbed to the soft-money system for spouses often have little confidence and have lost their competitive edge. They should not require a formal academic curriculum. Seminars and workshops designed to enhance their motivation and self-esteem and rekindle their ambition could go hand-in-hand with programs that give them opportunities to become principal investigators. Academic credit should be given for the courses taken, and care should probably be taken to distance such credits from the always useful but sometimes "soft" continuing education credits that are often given for course work outside the formal academic curriculum.

Support for reentering women is needed in various forms. Financial support should be provided through special graduate school fellowship or scholarships. Special grants should be made available to those who graduate from reentry programs and plan to enter the real world of biomedical research in an academic setting. Examples of mechanisms that should be applied are seed-money grants, consultant grants, postdoctoral fellowships that would convert to grants, and apprenticeship grants for non-tenure track women to work with established (preferably) female researchers. Short, paid internships with government agencies or the private research sector have been used by some programs to provide financial help to the reentry student and to provide a current entry on the resume. The NIH could provide special incentives to investigators who offer postdoctoral fellowships to reentering women. Institutions could be encouraged to sponsor reentry women who are applying for research grants as principal investigators by allowing the institutions extra indirect costs.

Moral support should be provided to women reentering the scientific research world in the form of mentoring programs and support groups. Seminars and counseling on developing networking skills, initiating and maintaining mentoring relationships, and preparing women for the problems they may face in the work force should be included in any program designed to promote the reentry of women into biomedical research careers.

Finally, given that most women leave science because of family obligations, on-site child care is potentially the single most effective inducement for these women to reenter.

Assessment of the effectiveness of the reentry program is important. The number of women entering, leaving, and completing the programs should be tracked. Experts in assessment could conduct entrance and exit interviews to determine motivations for reentering, reasons for dropping out, or level of satisfaction with the program. Midcourse assessments could be made with the help of an advisory board composed of institutional and private sector scientists and administrators. Graduates of such programs should be surveyed in later years to determine their employment, salary, and career satisfaction status.

## Needed: Strategies for Advancing Women

*Panel Presenter:*
*Luther S. Williams, Ph.D.*

The broad and critically important issue of women's biomedical careers must be placed in the context of larger circumstances. Currently, there is a critical window of opportunity that derives in part from the virtual explosion in the basic science knowledge base. The opportunities are there because of the rapid rate of scientific developments and the rapid translation or conversion rate between basic discoveries and application. Most of the exciting research resides at the indices between physics, chemistry, and math, all of which are applicable to the biological sciences. The second context that frames the issue is the dynamic of the broad public assessment of the integrity of the biomedical enterprise. The third context is that the same universities in which we desire to make gains for women in careers and education are experiencing a set of circumstances unlike anything they have experienced in the last 40 years. From that perspective, it is not necessarily the best time to solve problems.

To problem solve, we must define a purposeful set of strategies. For example, if one is going to add to the faculty of a university, clearly one would desire to do that in a fashion that does not attempt to move from the maximum to the minimum. An incremental process akin to the value systems of the institution would represent a comparatively facile and sensible structure, or purposeful strategy. We have to be overly pragmatic. What we desire to do has to be rigorously grounded in terms of outcomes, and all participants have to be held accountable.

Another component of the new strategy, a strategy for the rest of this century and into the future, is problem formulation. The issue is almost made by the title of this workshop: recruitment, retention, and reentry. Those are processes, not ends. We need to answer the following question: What do we desire to accomplish? How many or what level of participation of women in the biomedical sciences does one desire in the highest leadership roles?

You seek to attract individuals into an academic sequence in order to produce a product. What you desire at the end of the sequence is a recipient of a bachelor's degree or a doctorate degree or a full professorship. To do that one must acknowledge a continuum and that continuum encompasses each of these three otherwise discrete activities.

A goal of increasing the number of tenured associate professors in the university would require a whole set of activities. Completing the undergraduate degree would not be the issue if one were attempting to produce a professor; it is simply phase one in a multi-tiered process.

Mentoring is important and we have to make the transition from its being an ad hoc proposition. Everyone acknowledges that it is important, but how it occurs within a faculty of 40 or 60 individuals should not be left to serendipitous transactions. It is possible to actually develop and support a program in a variety of ways. One could create incentives for the participating faculty mentors to make such an operation work. There should be networks among women scientists through which women could be supportive of one another in boards and nomination processes.

## Summary of Panel Discussion

*Carol Aschenbrener, M.D.*

Addressing the challenges of advancement for women in medicine and science requires consideration of the role of personal responsibility versus institutional and societal responsibilities. Educational institutions are beset by a complex of diverse, sometimes conflicting, demands in the face of limited resources. They can and should prepare individuals to effect change but cannot themselves correct societal problems such as inadequate day-care resources. Our choices determine whom we will become and, thus, should serve personal priorities. Every choice has consequences, but we will not feel powerless if we remember that we do choose how we allocate time, energy, and creativity. Mentoring serves many important roles, one of which is to help trainees and faculty identify options and understand the consequences of different choices. For example, an individual who assumes difficult responsibilities central to the mission of an academic unit is more likely to be rewarded than one who pursues activities that do not serve the mission and goals of the unit.

Flexibility on the part of individuals and institutions is needed. Institutions should publish leave policies for care of dependents and should be willing to consider less than full-time appointments wherever feasible. Reconsideration of the length of the probationary period for tenure-track faculty is already underway at some institutions. A redefinition of the relationship of professional responsibilities and compensation, with periodic renegotiation between the faculty member and department chair, would give individuals and academic units greater flexibility to meet a variety of needs, including parenting responsibilities.

Panelists emphasized that competence is essential, but not sufficient, for advancement. To advance in an organization, it is also necessary to be a team player, to work well with others in the pursuit of organizational goals. Skills necessary for advancement cannot be learned in isolation. Participants are encouraged to reach out to those with more experience who can be mentors and guides and to reach back to those with less experience to share their experience and extend the network.

## Women in Academic Pediatrics: Preliminary Facts

*Panel Presenter:*
*Jane G. Schaller, M.D.*

Since I am a pediatrician, I will focus my remarks on women and their status in academic pediatrics. Almost 40 percent of students entering medical school in 1991 were women. What paths do women who graduate from medical school choose? About 50 percent of residents now training in pediatrics are women (Table 1); 27 percent of residents in internal medicine are women. Upon completion of residency training, 59 percent of women enter general pediatrics; few go into high-powered subspecialities such as cardiology (Table 2).

**Table 1. Distribution of All Women Residents, 1989**

| Specialty | Number | Percent of All Women Residents | Women Residents as Percent of Total in that Specialty | | |
|---|---|---|---|---|---|
| | | | 1987 | 1988 | 1989 |
| **Internal Medicine** | 5,147 | 21.7 | 27.8 | 26.0 | 27.4 |
| **Pediatrics** | 3,217 | 13.6 | 52.2 | 49.0 | 50.3 |
| **Ob/Gyn** | 2,040 | 8.6 | 46.1 | 46.0 | 44.2 |
| **Family Practice** | 2,254 | 9.5 | 29.2 | 29.9 | 31.7 |
| **Psychiatry** | 2,080 | 8.8 | 40.9 | 38.7 | 40.6 |
| **General Surgery** | 989 | 4.2 | 12.9 | 12.5 | 13.0 |
| **Anesthesiology** | 939 | 4.0 | 19.6 | 19.2 | 20.3 |
| **Radiology, Diagnostic** | 847 | 3.6 | 23.4 | 24.1 | 24.7 |
| **Pathology** | 858 | 3.6 | 37.4 | 36.1 | 38.0 |

Source: Association of American Medical Colleges (AAMC), *U.S. Medical School Faculty 1991*. Faculty Roster System, Washington, D.C.: AAMC, 1991.

**Table 2. 1991 First-Time Takers Pediatric Subspecialists**

| Training Plans | Percent Male | Percent Female |
|---|---|---|
| Cardiology | 80 | 20 |
| Critical Care Medicine | 57 | 43 |
| Endocrinology | 55 | 45 |
| Gastroenterology | 71 | 29 |
| Hematology/Oncology | 56 | 44 |
| Neo/Peri Medicine | 61 | 39 |
| Nephrology | 43 | 57 |
| Pulmonology | 56 | 44 |
| Rheumatology | 0 | 100 |
| **General Pediatrics** | **41** | **59** |

Source: American Board of Pediatrics (ABP), 1991.

For women who choose careers in academic medicine, the big three fields in numbers are internal medicine, psychiatry, and again pediatrics (Table 3). In 1975, 27.7 percent of pediatric faculty were women; in 1991 the figure was not much greater, 33.9 percent. What ranks do women attain in academic pediatrics? Although many women have been in this field for some years, there are still discrepancies in faculty rank (Table 4). Among men in academic pediatrics, 50 to 60 percent have attained the rank of associate professor or professor, whereas only 30 percent of women are professors or associate professors; 70 percent of women are still clustered at the assistant professor or instructor level. And how many women rise to lofty positions such as department chair? According to the Association of American Medical Colleges (AAMC), of 126 academic pediatric departments in the United States, only 6 departments currently have women chairs.

Is there a problem? How can we decide? What I want to concentrate on today is fact-finding. Facts should help us define and understand problems and also provide ammunition to effect change. The Association of Academic Pediatric Chairmen of the United States is sponsoring a survey of all academic pediatricians in the United States. We have sent out 6,441 questionnaires and to date have close to a 70 percent response rate. Our questionnaire seeks to address such questions as: Are there differences between genders at academic ranks? Are differences between genders in salary and rank explained by research productivity, by institutional characteristics (such as research support), or by differences in values and attitudes? What are the attitudes of men and women in academic pediatrics? We think that this will be a well-done survey, for which I must give much credit to my colleague, Dr. Sherrie Kaplan at the New England Medical Center, for her expert help in putting our ideas into a questionnaire of 36 pages that the majority of academic pediatricians have actually filled out! We are now in the process of analyzing the data.

Several representative points can be made from the preliminary analyses of the data from this questionnaire. First of all, women seem to have different *career aspirations* than men. It appears that very few women aspire to be deans

**Table 3. Women Faculty in Clinical Departments**

| | 1975 | | 1991 | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Anesthesiology | 233 | 19.1 | 672 | 22.8 |
| Family Practice | 89 | 14.8 | 419 | 25.6 |
| Internal Medicine | 630 | 8.7 | 2,551 | 17.3 |
| Obstetrics/Gynecology | 183 | 13.4 | 688 | 26.8 |
| Pediatrics | 917 | 27.7 | 2,218 | 33.9 |
| Physical Medicine | 164 | 29.2 | 215 | 35.9 |
| Psychiatry | 852 | 19.1 | 1,407 | 26.1 |
| Surgery | 141 | 3.9 | 505 | 9.1 |

Source: Association of American Medical Colleges (AAMC), *U.S. Medical School Faculty 1991.* Faculty Roster System, Washington, D.C.: AAMC, 1991.

**Table 4. Faculty in Academic Pediatrics, 1991**

| | Men | | Women | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Professors | 1,253 | 29.2 | 239 | 10.7 |
| Associate Professors | 1,183 | 27.6 | 449 | 20.2 |
| Assistant Professors | 1,561 | 36.4 | 1,140 | 51.3 |
| Instructors | 283 | 6.6 | 390 | 17.5 |
| **TOTALS** | **4,280** | | **2,218** | |

Source: Association of American Medical Colleges (AAMC), *U.S. Medical School Faculty 1991.* Faculty Roster System, Washington, D.C.: AAMC, 1991.

or department chairs in academic pediatrics. Nor do women want to be division chiefs; they do, however, want to be full professors and achieve tenure. Further analyses will focus on other attitudes that may be related to career aspirations. Concerning *research productivity*, it appears that in academic pediatrics women are less often the first or last authors of papers, and women get fewer research grants than men. Adjusting the data for age and rank does not appear to change these gender differences. Concerning *career progress* by gender, women feel significantly hampered by a number of obstacles. Furthermore, more than half of women in academic pediatrics feel that they have been victims of sexual discrimination in the workplace (as compared with only 3 percent of men). Concerning perceptions of situations that have *delayed career advancement*, women feel hampered by child rearing and spouse's careers while, interestingly enough, men seem concerned with financial problems. Women also worry about the effects of aging on their careers; getting older seems to be harder for women than it does for men. Concerning *attitudes* toward careers, men feel that their careers come first, that the price of academic success is worth the benefits, and that it is important to strive to reach the top. Men do not mind working after hours, and they would often choose faster career progress over a balanced life. Women, on the other hand, seem to feel that the demands of academic pediatrics may be incompatible with their basic values and that career demands placed on them may not be worth the tolls extracted. Women also feel that they should be taken more seriously as professionals than they are. There seem to be significant differences here in attitudes toward careers between men and women that we need to understand better if we are to move ahead.

From these data, we can already draw a number of preliminary conclusions. In academic pediatrics, approximately two-thirds of men as opposed to one-third of women are at the associate professor rank or higher. Genders differ significantly in career aspirations. More women than men report delays in career progress because of child-care and family responsibilities. More women than men are demoralized and dissatisfied about their careers. More than one-third of women and men report moderate to serious problems with professional stress, salary support, availability of support staff, and competing priorities.

Other issues that I think are very important to address in addition to factfinding are family and child issues. Women should no longer have to choose between having successful careers and having successful families. We just have to figure this one out.

Mentoring and career advancement also demand consideration. In a field such as pediatrics, where 50 percent of the young people who need to be mentored are women but only 4 percent of the chairpersons and 30 percent of the senior faculty are women, it is obvious that men are going to have to learn to mentor young women. This brings us to the uncomfortable business of sex and professional relationships between women and men. We do not talk much about this, but we need to. Some of my colleagues' wives tell me very frankly: "I don't want my husband mentoring young women." Over and above the other very real issues of sexual harassment and sexual discrimination that are more often spoken about, we need to find ways to create a climate that will allow women and men to work together as professionals.

Finally, preliminary results of our study indicate that even when the data are adjusted for age and rank, women suffer inequities in salary. These inequities are $8,000 as assistant professors, $10,000 as associate professors, $14,000 as professors, and $11,000 overall. This seems to be a widespread finding in academic medicine.

Why must we be concerned about the status of women in academic pediatrics and academic medicine? The answer is obvious. In fields like pediatrics where 50 percent of those entering the field are women, the future of the profession depends on the success of women. Over and above the fact that women should have the right to achieve their potentials as intellectual human beings, we must realize that the success that we allow women to achieve is vital to all of our professions.

How are we going to move ahead? Well, here is one method: the woman warrior in her chariot brandishing her sword. This probably is not a very good method in modern times, with all due apologies to Antonia Frasier and Queen Bodacia.

Rather, I suggest that we need facts, intelligence, ideas, careful planning, determination, and a full measure of good will. We are, after all, in life and in professions with men as well as women. We must figure out ways to make our professions work for all of us. I hope this conference will be a step forward in that regard.

## Levels of Responsibility

*Panel Presenter:*
*Donald R. Mattison, M.D.*

A historian of medicine in public health, John Duffy, commented that for progress to be made in any area of health, three things have to be considered: the model of the condition, the political factors, and the financial or economic factors. I would like to add to those factors a consideration of levels of responsibility. Within an institution, government is distributed across the levels of participation, from the academic administrators through the faculty to the students and staff. I think that there are issues of responsibility for advancement and workplace climate that also are differentially distributed across various levels. Some of those issues are personal, some of them are institutional, and some are actually much larger and require national commitments.

To that end I will comment on a study reported by Cole and Zuckerman, in *Scientific American* several years ago.[1] They asked the question: Why do women scientists generally publish fewer papers throughout their careers than men? They suggested that some of the older explanations included issues of bias or discrimination, suggestions that there were biological differences in aptitude, or perhaps that there were family issues that impeded or altered publication records. They explored this question by looking at the patterns of publication by women scientists as a function of whether they were married or single, had or did not have children. Eighty percent of the women they surveyed were in math or the physical and biological sciences. Basically, what they observed was that, across all levels of scientific advancement, publication patterns were remarkably similar for men, women, single or married women, or women with or without children.

Those patterns suggest that men and women do not differ. There are, however, other costs or impacts that are not considered in that kind of question and in the way that it is answered. All of the scientists with whom they discussed this issue suggested that one of the biggest impacts was on discretionary time and on flexibility, the ability to decide to spend an evening in the laboratory or to go out and discuss current science issues. In her book *When the Bough Breaks* Silvia Hewlett[2] states that current national policy treats parenthood as an expensive and expendable private hobby. Despite this, institutions can play a role. Interesting innovations that institutions can make in changing the workplace climate have been identified and have been very successful according to earlier panel presentations. They have improved recruitment, reduced turnover, and more important, have had a substantial and salutary impact on morals and productivity.

**References**

**1.** Cole, JR, Zuckerman, H. Marriage, motherhood, and research performance in science. Sci Am. 256 (Feb. 1987): 119-25.

**2.** Hewlett, SA. When the bough breaks: the cost of neglecting our children. New York: Basic Books, 1991.

## Tailoring the System to Women's Needs

*Panel Presenter:*
*David M. Brown, M.D.*

Women constitute 35 to 45 percent of medical school matriculants and graduate students in basic biomedical sciences and represent an important pool of potential faculty members at medical schools and universities. However, barriers to academic careers for women exist because of the widespread uncertainty, shared by both women and men, concerning future advancement and rewards. Barriers to women in particular are still imposed by the system itself and, in some instances, by the male dominance of the fields with insufficient responses to women both by deed and by attitudes conveyed. It is clear that, not only for the benefit of women themselves but also for that of the disciplines and the schools, more effective and productive efforts are warranted in the recruiting, promoting, and tenuring of female faculty in medical schools.

The barriers to recruitment in clinical departments are likely to vary dramatically among the disciplines and are likely to be proportionate to the representation of women in the residency programs. Specifically targeted recruitment to academic positions should occur during residencies and must include both academic training *per se* as well as encouragement and active mentoring. For a successful academic career, residents must receive formal training and research experiences, usually during a formal postresidency fellowship. The formal academic training period may represent a particular challenge to women because it may conflict with other priorities that individuals or couples have established for their personal and professional lives. Two to three years of additional academic work after completion of medical residency add financial and time burdens. Pregnancy and the need for parental leave complicate smooth transitions and flow through these intensive periods. Program directors and faculty supervisors need to be sensitive and responsive to these needs. Program flexibility and policies for pregnancy and parental leave are necessary.

Some of these same issues exist during the first years of a probationary tenure-track appointment. Mentoring is frequently a missing ingredient at this crucial period of a female faculty member's appointment. The availability and quality of mentors should not depend upon whether the recipient or the provider is a woman or a man. The mentoring issue remains a vital matter throughout a faculty member's career, no less so after tenure than during the probationary period.

The length of probation for tenure-track appointments may affect women in particular. For clinical and basic scientists, the 80-year tradition of a 6-year probationary period for determining tenure is inappropriate. The time is insufficient to develop a record of publications and funding. Whereas this serious limitation is applicable to women and men, women are at greater risk and vulnerability. They are more likely than men to have their careers interrupted during the probationary period. Despite stopping the tenure clock for allowed absences, neither basic nor clinical research can be turned on or off within the strict limits of leaves. This situation only leads to inescapably prolonged but unavoidable gaps in productivity. Therefore, for women and for men, but particularly for women, the standard limitations for the duration of the probationary tenure period should be extended. Since most universities seem bound both by traditions and by the guidance of what standards predominate in peer institutions, widespread efforts should be made to increase the outer limit for probation.

The academic system is based upon role modeling. Male role models tend to be adequate but are lacking for women. There are too few women in tenured administrative and faculty positions in most medical schools. The situation requires careful tending by academic leadership. Endowments for women in medicine and for research on women's diseases should be created.

A special barrier is spousal recruitment. Both members of a couple require career satisfaction; a win or a loss for either spouse runs a high risk of marital strife or career jeopardy. Given the financial constraints facing all institutions and the lack of ease of simultaneous placement of both spouses in equally acceptable employment, department heads and deans should be proactive in finding acceptable employment for both spouses. Furthermore, academia must recognize that both women and men have responsibilities for their families that call them away from the workplace.

The views of women in academic medicine need special attention and consideration. There is no better way to accomplish this objective than to have women share the forum with men in academic centers and for all academicians to encourage this transition in each institution.

## Overcoming Barriers to a Career in Industry

*Panel Presenter:*
*Helen M. Free, D.Sc.*

Barriers exist for women who seek a career in industry, but they can be overcome with planning and positive action. First, combining a family and scientific career is possible, although it requires an understanding husband and cooperation from the family as well as the employer. It may require sacrificing some things, such as a spotless home, not having much time for personal recreation, no bridge clubs, hobbies, or neighborly chats, but each woman must decide on her own priorities. Second, for couples it may be difficult to find similar opportunities for both wife and husband and relocation may be necessary to meet both spouses' career needs. Fortunately, young women and men of today tend to weigh the benefits of either spouse's offer before making the decision to move. Third, with the present trend to downsizing, it is imperative that all professional and managerial women have plans in hand of how they will proceed if they are let go by an employer.

The time has disappeared when a job lasted forever. Both women and men face severe competition, and it is important for a professional to expand capabilities, training, and knowledge. Learning is less likely to be paid for by employers and will require self-investment for education. Fourth, women tend to assume that they cannot win. Instead, women should play to win. Instead of accepting the "I don't have a chance" attitude women should cultivate the "I can do it" attitude. They must have the proper attitude to "get ahead," to get that promotion, to make that sale, and to plan that experiment. They should not make too much out of being a woman. They should avoid the "they owe it to me" attitude and help one another. Playing the "good guy" rather than the aggressive, unfair role is more successful in the long run. Also, women seem hesitant about asking for what they want and about telling their bosses about their qualifications. They tend to assume that everyone knows that they would like that promotion, but bosses are not mind readers. They need to be told.

Although the barriers are there and it is slow going, it is a winning battle. Every major corporation now has a woman on its board of directors. Women's programs of all kinds help us to catch up. To put women in high-level positions takes more than just the boss's acceptance because it is bucking the whole culture.

## Administrative Leadership

*Panel Presenter:*
*Roger J. Bulger, M.D.*

Institutional administrative policy, practice, and leadership have important moral and ethical implications for all people associated with the institution. In academic health science centers, the substance and style of top administrators send important behavioral and pedagogical messages to faculty and students alike. By its own example, the institutional administration tells its members how it treats people, how it values people, how it values integrity, how it values learning, how it values service commitments, what it thinks of the expression of a pluralistic society through its staff and constituents, and how it deals with the goal of developing the talents and careers of individual people. Administration and management, too long focused on authoritarian, top-down, charismatic leadership styles must now turn to participatory, communicative, process-oriented approaches, built on respect for alternative views, while recognizing the need to make timely decisions and get on with things.

Such new leadership cries out for the participation of many more women at the forefront of the institutions, women who will be able to foster the development of younger faculty open to these values. The liberating feature of such administrators is their willingness, in the pursuit of doing the best thing, to give up the sort of gestalt that calls for control and survival in the position at all costs. This ability to conceive of one's own administrative "death" is as liberating as the liberation in one's personal life that comes from dealing with the reality of death.

It is important to appreciate the impact of institutional behavior on the behavior of the people within its purview and influence, just as it is important to appreciate how the personal values of the institution's leaders can influence the ethical expressions of the institution.

Academic health centers trying to deliver competent and compassionate care, seeking to educate the next generation of health professionals, and working at the uncovering and transmission of new, basic, and applied knowledge are institutions that are aimed at expressing some of the most visionary and far-reaching ideals of Western democratic society.

Such institutional ideals require leadership based upon a broad and deep set of values. Academic health centers need more women to lead them, and more and more of them are recognizing that.

## Control: Abuse of Power

*Panel Presenter:*
*Lillian Gonzalez-Pardo, M.D.*

Power is synonymous with control and authority; it can be positively used to encourage enthusiasm, build energy, and promote self-confidence, or it can be abused. Abuse of power is neither harmless nor trivial.

As more women enter the workplace—projected in the year 2000 to constitute two-thirds of new entrants into the workplace—it is imperative that power not be abused. Abuse of power in the workplace has profound lifelong personal, professional, and economic effects, especially for women. Catherine McKinnon, legal scholar and leader of the sexual harassment frontier has stated that ". . . sexual harassment, broadly defined, refers to the unwanted imposition of sexual requirements in the context of a relationship of unequal power." In all aspects of our society, the predominance of men in positions of power often puts women on the defensive as well as on the offensive to even get close to the "glass ceiling." This situation cannot continue.

Today's female physicians struggle with inequality in the power structure as it exists in medical schools, hospitals, and other healthcare facilities because the deans, CEOs, and senior management are predominantly men. Sexual harassment, in all its forms, occurs in these settings, which eventually undermines morale and productivity and decreases opportunities for career advancement.

The American Medical Women's Association (AMWA) was founded in 1915 by pioneering female physicians to promote women in medicine and to improve women's health care. Over the last few decades, we have witnessed remarkable changes and improved opportunities for women. Although we represent only 17 percent of all physicians in the United States, the female medical students make up 36 to 50 percent of most medical school enrollees across the country. Despite these increasing numbers however, women are still concerned about their access to the leadership and power positions in medical schools and health care facilities.

For many years, AMWA has studied barriers to women's achievement in medicine. We have expressed many concerns about women being prevented from entering power positions. The lack of female role models and the lack of mentors and leaders at the top are important, key factors. Women lack role models because there are fewer of them in senior faculty and research positions. In addition, male mentors make themselves less available to female physicians than to their male colleagues and they provide less feedback—positive or negative—to female students and residents. Mentors form a fundamental rung in the career ladder of medicine. Without mentors, women are handicapped in obtaining research grants, publication opportunities, tenure-track positions, and other research and clinical opportunities. AMWA strongly urges institutions to look at these major barriers and to support efforts to increase and improve the access and opportunities for women at all levels of their professional development.

Leadership training programs and establishing pay equity for women in science and medicine are goals that all institutions need to adopt if we, as a society, are to improve access of women to appointments, promotion, and power. Leadership training programs help women, who are often the most talented but least vocal among the medical leaders and need guidance in getting public recognition for their accomplishments, so they are able to negotiate equitable salaries and navigate their career tracks. We must recognize institutions that provide positive incentives for exemplary behavior in creating model gender-equity programs.

AMWA is committed to establishing power equity and balance. We also emphasize that gender imbalance in biomedicine ultimately harms female patients. Studies show that women have not been getting an equitable share of

research opportunities, as scientists or as subjects of research. The result is a gap in our knowledge about conditions that are more common among or unique to women. AMWA has also initiated an Advanced Women's Health Curriculum Program, which has developed an interdisciplinary, comprehensive continuing medical education course to update all physicians on women's health research. This will eventually lead to better care of women based on scientific data from female participants and not derived from studies done with only male participants.

## Power: Its Use and Abuse in Academic Institutions

*Panel Presenter:*
*Nancy E. Gary, M.D.*

The dictionary defines power as "the position of ascendancy, the ability to compel obedience, control, and dominate." I think that power really is having money or information or the control of money and information. It is having valuable things that other people want.

How do you get to a position of power? If you are a woman and you *are in it*, it probably *is not a position* of power because *most women are not in those positions* in academic institutions. Few women are chairs, particularly in departments such as medicine and surgery, and precious few women have been deans. There have been only four female deans in coeducational medical schools to date. Getting power boils down to three things: hard work, mentors, and knowing the right people. Go to work every day. Develop competency and confidence so that you are willing to take risks. Be able to take risks. Know the rules of the institution or the organization. Know who the power players are. Become political within the organization in a positive way—not politically for your benefit but politically for the institution's benefit.

How do you use power once you have it? Whether you have perceived power or real power you must use it wisely and carefully. Women can exercise their power in somewhat more unique ways because they tend to negotiate and build consensus. In situations in which you are negotiating and moving an issue forward, there are only so many "no's" that you can use, so use them wisely. Be positive about things. What is needed from leadership within an institution is to help to move it forward.

What happens when you discover that you do not have much of a power base? Although the position of dean is viewed as a position of power, the power, in fact, is in the faculty. The faculty is responsible for the education of the students. The faculty conducts the research. The faculty wins the grants. The faculty teaches clinical medicine and the faculty generates income through faculty practice. So really there is a strong power base spread among the faculty of an institution and the dean's role is to use wisely the resources of an institution. The other thing to do when you discover that you do not have much of a power base is to make sure that your infrastructure is intact and, if not, to build an infrastructure.

Why don't some women use the power they have? In some instances women do not know they have the power, and in other instances they feel those above them are more powerful and so they do not exercise the power they do have.

Regarding the abuses of power, it takes two to abuse. There has to be someone who is abusing and someone who is abused. Most of harassment, sexual and otherwise, can be handled in a very calm, professional manner. You do not have to be abused, but it is important to remember the three R's: the risk of retaliation is real. However, if you are a good, competent worker you are not very vulnerable. Abusers are not likely to retaliate for frivolous reasons. What makes people vulnerable? Either they have an inability to get alternative employment, which is unfortunately true for many people, or their job is subject to the evaluation of a single individual.

What forms does abuse in the workplace take? One form is withholding information, by not letting employees know what the big picture is, by not letting them know where their piece fits into the big picture, and by not letting them know how their contribution will fit into the mosaic that is the structure of the institutional organization. Another abuse of power in institutions is leapfrogging through the hierarchy, particularly by those in the more powerful positions who bypass people in the direct line of responsibility, particularly in personnel matters.

Another abuse is not setting clear expectations for the employees. If they do not know what is expected of them, they cannot meet your expectations. Another abuse of power is displacing a deserving professional by making yourself or someone else the principal investigator of a grant or by including yourself as author on a paper to which you have made little or no contribution. Recruitment is another area where there is abuse of power. Individuals in organizations advertise positions tailored to fit one person that they already have in mind. Unfulfilled promises are another abuse of power. People are recruited and told that they will have faculty and staff and protected time for laboratory research; they come and then those promises are not fulfilled. Inequity in salary, slower promotion, and tenure rates are other abuses.

A recently conducted survey found that there were five messages powerful women got while they were growing up. They felt loved and special. They could do anything they wanted. They dreamed of greatness. They were able to take risks. They were able to use creative aggression and remain feminine. All except the first are messages that most women do not get during their formative years.

Mentors are important, mentors in the sense of Athena as she came in the appearance of a wise and trusted guide to Amicus who sought Odysseus. A mentor is someone who is impartial enough to hold a mirror up to you and close enough to advise you when you seek confirmation. Remember that Socrates taught Plato, Plato taught Aristotle, Aristotle taught Alexander the Great, and he conquered the world as it was known in 330 B.C.

We need to have a level playing field, and I am not sure how we are going to get that. Deals are made in men's clubs and men's locker rooms, and that is a hard place for women to be in order to be part of the deal making. Remember that women's styles of leadership tend to be intuitive, relational, consensus building, and team building. Isn't that what corporations at academic institutions are looking for through Total Quality Management?

## Sexual Harassment: A Political Approach

*Panel Presenter:*
*Rebecca Vigil-Giron*

The problems of gender role stereotypes, sexual harassment, pay inequity, and all those other inequities plague all of us, of all ethnic groups. To approach this issue in a political manner, it is essential either to be the boss, to support that person who is going to be sensitive to recommendations, or to be elected into office and have an opportunity to buy into the decision-making process.

When Anita Hill courageously talked about her experience of sexual harassment, it caused an explosion of discussion about that issue; but, more important, it caused reality to set in, political reality. Women were not part of that Senate committee hearing process, therefore, women were not going to be discussed. The whole issue of sexual harassment could have been addressed at that time, and policies or recommendations could have been determined right then and there, but women were not there.

The New Mexico Commission on the Status of Women receives at least 30 calls a week from women who have experienced sexual harassment on the job in city, state, and Federal Government entities as well as in the private sector. The state commission will propose legislation that will address sexual harassment and will send the resolutions throughout the country asking every legislature to address this problem at the city, state, and Federal levels.

Until women are willing to take on the responsibility of being elected into office and being appointed to key policy-making positions, they will not see an environment free of gender and racial inequities. When women are in powerful positions, they can provide the support systems, leadership for promotions, pay equity, employee benefits, day care, etc.

Now is the chance of a lifetime to elect more women to the U.S. Congress. Even at state and local levels, more women are fed up with the status quo because that status quo excluded them from the picture for too long. They, too, are being elected into office. By supporting these women you will be part of the renaissance of our country, a renaissance that will address the inequities and struggles of all women. And the beauty of that is that we will all, women and men, benefit from what is accomplished at the city, state, and Federal levels.

# Effective Power

*Panel Presenter:*
*Marjorie P. Wilson, M.D.*

In her book *Paths to Power*,[1] Natasha Josefowitz distinguishes between power as forcefulness and power as effectiveness. Power as forcefulness is the traditional finite idea of power, the ability or official capacity to exercise control and authority. Power as effectiveness is more elastic; it can change its shape according to the needs of the people and the organization. Power is bad or good, depending on whether it is used to further one's own ends at the expense of others or is used to help people formulate their own goals and provide them with the means to achieve them.

Unfortunately, not all power that one encounters is the so-called effective power; there is a great deal of forceful power in many, if not most, organizations. There are two parts to effective power: (1) the ability to get things done and (2) the force beyond that that allows or permits you to get it done. The two parts of *effective* power require knowledge, competence, and trust. First, the ability to get things done requires that one have basic information about the subject area, as well as the skills and insight about relationships among people and between issues and concepts. Women tend to look for patterns, how things fit together in unusual ways; this can result in innovation and creativity.

The second aspect of effective power deals with what others allow you to do. A study of four medical schools revealed that if the dean worked with faculty over time and developed their trust *and* if the faculty perceived the dean as working in the best interests of the institution, they *delegated back* to the dean more and more power to make decisions that affected them. The dean was then able to take more risks and progress was made more rapidly. Trust and respect must be earned, and they are earned as a result of the demonstration of integrity and strength.

I believe that most women have effective power. Power that generates an excitement and cohesiveness that energizes the group can pervade the organization. It is really leadership.

Two fundamental cultural or societal issues in our country handicap women in their ultimate career development. One is our enchantment in the United States with youth, and the other is the multiple commitments that women make to work and to family. With regard to the cult of youth, women older than age 50 are simply not able to just relax and grow old easily, growing in maturity and gaining respect along the way because our culture is preoccupied with looking young and trying to feel young.

In fact, if a woman's multiple commitments have included raising a family, reaching middle age may mean less responsibility logistically and may well allow for greater concentration on work. The commitments that women tend to have, especially family responsibilities, may make it difficult for women to take on greater job responsibility, but at the same time they develop a certain comfort with managing complex problems. Women have learned how not to get crazy when they are not in control, but rather, to get things done.

Cultural attitudes that place women in a one-down position or require that they meet a standard of perfection in performance or appearance beyond that required of male peers will change only very slowly. Women will have to make that change come about by agreeing on objectives and outcomes, by deciding what rules to change, and then planning to go about changing them.

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*Maxine Singer, Ph.D.*

Bright and early one morning in the mid-1960s, the telephone rang in my laboratory; it was the executive secretary of an NIH study section. Would I, the person wanted to know, become a member of a biochemistry study section? I chuckled, and said, "no thank you, you haven't wanted me or thought me qualified before," and as far as I knew nothing much had changed since the previous afternoon except that President Lyndon Johnson had decreed that all Federal Government advisory committees would, henceforth, have a substantial number of female members. I'd been getting along quite well without all that additional work and might just as well stick to the laboratory.

How I wish that I had continued to be so principled. But in the end, my ego or the promise of influence or the argument that it would be good for female scientists if they were represented on this or that committee got to me. I succumbed and found myself accomplishing some interesting and important work for science but also wasting many hours.

Many of you can tell similar stories. We have, by-and-large, been at least as serious members of many important committees as have our male colleagues. Often, we have served on even more committees and boards than our male colleagues because, given our small numbers and the mandated requirements for representation by women, we are needed, or so it is said. Some of us have served on too many such bodies, giving up a great deal of time that could otherwise have been spent in the laboratory or the clinic or with our families or walking on a beach.

One of the most interesting opportunities I had, at least in part because women were needed, was to serve on the board of trustees of a major private research university. Indeed, it was a stimulating and worthwhile 15 years. But it had a discouraging aspect. Each year the university administration reported to the board extensive analyses of the results of affirmative action policies for faculty hiring and promotion. The administration took this challenge seriously; I have no doubt of that. They worked hard with search committees trying to effect change, but progress seemed to be barely perceptible when it came to tenured faculty. And the explanations for this discouraging state of affairs were never totally satisfactory, not for want of commitment but because the explanations remained complex or obscure.

About 5 years ago, a distinguished colleague and friend at another major research university headed a search committee charged with recommending appointment of several senior scientists in several biomedical fields. He sent the usual letters out all over the country, and they contained the usual sentence about being especially interested in nominees who were women, a sentence he truly meant. And he had the usual response; no women were nominated. So he sent another letter, somewhat less formal. "Look guys," he said (or something like this), "I really mean this. Search your brains and your souls and tell me about the terrific female graduate students you've trained and what they're doing now." Did it work? No. So, finally, he went searching himself, and of course, he identified smashing female candidates and even managed to attract several of them to his institution.

Some 25 years after President Johnson's directive, in 1990, I was completing a term on what is widely believed to be an influential and important policy committee of especially distinguished members of the National Academy of Sciences (NAS) representing a variety of research fields. The committee members were discussing possible replacements for those about to rotate off the group. Physicists suggested physicists, biochemists suggested biochemists, and so forth. They turned to me and said that, with my departure, the committee would be without a female member and would I please

offer some ideas for women who might be appointed. I should have done my bit, recommended names, and tried to ensure opportunities for women on this committee. But I was frustrated. So I pointed out that people carrying two X chromosomes did not constitute a particular branch of science, and I thought that they would know the women in their own fields better than I would, so why didn't they come up with the names. It was, I said, their responsibility, not mine, to be sure that women were part of the committee.

Why am I telling you all this? You've all had similar experiences and could tell many similar stories. The point is that a great deal of progress has been made and the opportunities for women in research are substantially improved compared to 25 years ago. Recently, the *New York Times' Science Times*[1] featured a story about telomeres, their possible role in maintaining viable cells, and perhaps even their association with the phenomenon of aging and with the vigorous growth of tumor cells. The new work as well as much of the earlier work on telomeres has been correctly credited, and all the major contributors have been women, starting with Barbara McClintock's studies on chromosome stability right through to the recent work of Elizabeth Blackburn and Carol Greider.

Yet, we have to face up to the fact that affirmative action, no matter how laudable it is (and I think it is), has worked at a snail's pace. Many women have been trained in science in the last 25 years and many of them are superb, accomplished scientists. Still, so few have reached the professorial ranks and so many are still being discouraged. You have no doubt read the recent *Science*[2] magazine issue on women in science. The situation is still so dismal that they actually characterized chemistry as a field that was middling on the issue of opportunities for women, somewhere between neurobiology, which was painted as being pretty good, and mathematics, which was deemed to be the pits. How many chemistry departments do you know of where women abound and feel as though they belong?

Now, we can wait around for a while longer in the hope that progress will slowly continue and that eventually affirmative action will really work. In the meanwhile, a lot of money that could be used for good science will be spent on studies that try to determine why affirmative action has not worked or has not worked more rapidly, and why young female scientists disappear somewhere between their Ph.D. or M.D. degrees and the assistant professor positions. Ultimately, all the "old school" men who still call us "honey" will age sufficiently to retire and maybe, just maybe, the younger men will be different. But it seems to me that waiting around is insufficient. Current strategies have an important flaw. No matter how hard we may work to have them succeed, they depend finally on other people, mainly men, changing their attitudes and expectations. In that same issue of *Science*, there is a telling quote from Shirley Tilghman, Professor of Molecular Biology at Princeton.[3] At a Gordon Conference she organized in 1988, fully 33 percent of the speakers were women; 2 years later, at another conference on the same subject organized by men, there were two female speakers.

With due respect to all of you and to the organizers of this conference, the conference agenda illustrates my point. It speaks to approaches that require others to change. Here are a few examples taken from the titles of this meeting's sessions. Recruitment, retention, and reentry imply getting the current research institution hierarchies to be responsible for the advancement of women. The workplace climate that is mentioned is a climate set by the current faculties. Who is abusing the power in the workplace? Men who are in charge. Who is expected to become sympathetic to nontraditional pathways? Men who are in charge. Who is doing the harassing? Men who are in charge. How will effective connections be made between the best of networks and the places where decisions are being made? Networks can provide sympathetic ears, but they cannot easily provide a laboratory of one's own. Keeping one's sanity is not the same as keeping one's laboratory. And who really wants to be part of the "old boys' network"?

What is needed is a strategy that depends on us. A strategy that assumes we will expend our energies on improving the opportunity for women to succeed in biomedical careers, not on complaining about the failure of others to do so.

We have to stop expecting that our male colleagues will change, particularly the leaders among them, those who are the best scientists.

The fact is, many of them are, understandably and appropriately, much more concerned about their own research than about the status of women. Their ambitions make them less than collegial. And, as Dr. Healy was recently quoted as saying: "If collegiality is the measure by which we evaluate good scientists, we might as well shut down right now."[4]

Similarly, we need to face the reality of our colleagues, as well as our own, ambitions and recognize that we are not about to change theirs. Indeed, ambition and competition are most often constructive elements in accomplishing good science. Wallace Stegner puts it very well in his novel *Crossing to Safety*.[5] The male protagonist thinks to himself: "Unconsidered, merely indulged, ambition becomes a vice; it can turn a man into a machine that knows nothing but how to run. Considered, it can be something else—pathway to the stars, maybe." We cannot expect that our male colleagues will or should, on our behalf, become more collegial or less ambitious or less competitive. So, not only is it unlikely that we could succeed in having them change to meet our needs, but also it is probably not desirable from the point of view of science.

There is another flaw in our current strategies. They address the world as it is, not as it will be. Yet, we want to succeed for the future; the present is, after all, almost past. Our energies should go into making sure that the future gets shaped to foster women's contributions to science.

A new strategy, therefore, must have three essential elements. First, we must strive to do the best science that we can: the most original, the most rigorous, the most interesting. Second, we must depend on ourselves and not on others to enable us to contribute to science and thus to human welfare. Third, we must make certain that we have a substantial say in the shape of the future.

What kinds of elements should go into a new strategy? We can gather some clues from our male colleagues who have, in the past 40 years, built an extraordinarily successful research enterprise in our country. By success, I mean that they have enormously enhanced our understanding of the natural world and the ability to use that knowledge for the benefit of the inhabitants of our planet—the ability, not necessarily the will, to use the knowledge in that way—that is a separate discussion for another day. Our male colleagues, like the scientists concerned with telomeres, have chosen avenues of inquiry that opened new fields and expanded even our very sense of what the questions are. We should emulate that but with our own agenda. In so doing we will move from the periphery, from being supplicants for fair treatment, to being the shapers of the future.

I'll try to be more specific. One example that has opened a door and that is pertinent to those, like yourselves, who are concerned with biomedical research is Dr. Healy's new emphasis on research into matters that affect women's health. There are additional indications that this will be an expanding field. The Institute of Medicine's annual symposium in October 1992 is entitled "Gender Differences in Health." There is now a Society for the Advancement of Women's Health Research, there is even a new journal, to begin publication this spring, called the *Journal of Women's Health*. Experience tells us that, with each new focus for biomedical research, new questions and new understandings about the fundamental properties of living things have emerged. Recall that each of the NIH's institutes (but one) is named for one or more diseases. The research sponsored by these institutes focuses on the diagnosis and treatment of the relevant diseases and on related fundamental research. The fundamental research has had profound implications for our understanding not only of the sponsoring institute's main concern but also for other diseases and for our understanding of nature. The same will be true of the new program on women's health.

Consider, for example, the phenomenon of menopause. What fundamental aspects of living things will be revealed when we understand this profound change? What will the implications be for understanding aging in general?

Another important focus for research on women's health is contraception. Currently, research in this area is practically at a standstill in our country. The findings of the 1991 *Women's Health Research Roundtables*, published by the Society for the Advancement of Women's Health Research, reminds us that "Adolescents in the United States become sexually active at about the same age as teens in Canada and Sweden and at the same rate, but the United States leads the industrialized world in teen pregnancies."[6]

Clearly, more choices among effective contraceptives are desperately needed. Many Americans past their teenage years would also welcome improved methods. Work in this area is likely to produce a substantial fundamental understanding of the processes of ovulation, oocyte and sperm maturation, and fertilization. A successful effort might also yield innovative routes out of a political issue that is tearing our country apart: access to abortion. Our male colleagues have not insisted that contraception be on the active research agenda, but we should be strongly motivated to guarantee that it is on the research agenda.

This area of research is important for yet another reason: the increasing world-wide concern for the environment. We are especially aware of this issue because of the Rio conference, and we all decry the extinction of uncounted, even unknown species. We need to face the fact that the unchecked expansion of our own species is a root cause of the loss of biological diversity. The recent joint statement by the officers of the Royal Society of London and the U.S. National Academy of Sciences entitled "Population Growth, Resource Consumption, and a Sustainable World"[7] asks: "What are the relevant topics to which scientific research can make mitigating contributions?" The first topic listed as an answer to this question is "development of new generations of safe, easy to use, and effective contraceptive agents and devices." Congressman George E. Brown, Jr., a great friend of science and chairman of the House of Representatives' Committee on Science, Space, and Technology, wrote recently in the *Chronicle of Higher Education*:[8]

> Many scientists, historians, and policymakers believe that population growth represents the fundamental challenge to humanity's capacity to achieve long-term environmental, economic, and cultural stability. Exponential growth of population triggers exponential growth in consumption of resources, in generation of waste products, in conflict and violence, and in disparities in economic status and quality of life.

The agenda I am proposing for those concerned with research in the field of women's health will not be easy to achieve. In our country, there are powerful political forces that would prefer to forget that the ramifications of sex are central to all our lives. At least in part, such views reflect a deep denial of women and women's legitimate rights and interests. Menopause embarrasses them; contraception not only embarrasses but also gravely troubles some of them. Indeed, there are indications that if the antiabortion forces succeed in turning back the clock by overturning *Roe v. Wade*, as well they may, they will then actively pursue an anticontraception agenda. But sound biomedical research in these areas will increasingly bring such matters into the open, will legitimize them, and will make it more and more difficult to ignore the associated societal and cultural realities. One day we may even see the Federal Government willing to fund scholarly studies of teen's attitudes toward sex and contraception and willing to replace the chapter on contraception that was deleted from the Government's book *Taking Care of Your Child,* a book distributed to Federal employees to give advice on child rearing, because it was believed to be offensive.

There are other roadblocks in the way of this agenda as well. In the negotiations about the agreements to be made in Rio, the Group of 77 developing nations deleted references to the urgency of slowing population growth. This found support from feminist health groups from the developed countries. As Jessica Tuchman Mathews pointed out in a recent column in the *Washington Post*, "Feminist health groups, along with some women's groups in developing countries and representatives of minority women in the U.S., have long been antagonistic to population control because they believe it jeopardizes women's health, is disguised genocide, or places blame on women."[9] Here again, sound science, the careful establishment of facts about life on the planet, and the biology of individuals and of ecosystems will make it increasingly difficult to ignore the realities.

I believe that a sound scientific agenda, based on vital issues of concern to women is one way to promote the role and status of female scientists. Here again, the Program for Research on Women's Health is an example; it sets aside monies to support research. Those whose proposals are excellent enough to be funded will have something special to offer research institutions at a time when new money is very attractive indeed. We need not applaud the importance of grant potential in recruitment, but it is a fact of life and advantage

can be taken. Moreover, it is very likely that several more women will be elected to state legislatures and to Congress this fall. There are 150 female candidates for the House of Representatives, more than twice the number in 1990. R.W. Apple, Jr., writing in the *New York Times*[10] suggests that 5 new women may be elected to the Senate, which now has 2 female members, and that there could be 20 new women in the House, which now has 29. Just as our male leaders have, in the past, cultivated the interest of senators and representatives in biomedical research to extraordinarily good effect, female scientists, too, can cultivate the interest of women in Congress to assure the stability and growth of the agenda for Research on Women's Health.

The availability of grants and the excellent science they support will not only contribute to the ability of women to capture faculty positions, but they also will strengthen bargaining positions during recruitment negotiations. A few years ago, Carl Djerassi wrote a letter to *Science Magazine* suggesting that extra help for child care should be considered comparable to the mortgage support that is used as a recruitment device in academic institutions. I have been wondering whether in families where one spouse's benefits provide for a family's health insurance the other spouse might not be offered child-care support as an employment benefit. There are many possibilities to think about. The important thing is to seize the opportunities that are being offered and to use them to define new scientific agendas that have the potential for major contributions to knowledge and alleviate societal problems. From this can come a vitality that cannot be ignored and that will place women at the center of the research enterprise.

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The sciences have always attracted women yet have posed formidable obstacles to their full participation and recognition. When Marie Curie almost singlehandedly created the field of nuclear chemistry and showed the world what a woman in science could do, she was awarded the Nobel Prize. But despite her outstanding accomplishments, she was denied membership in the all-male French Academie des Sciences until she won an unprecedented *second* Nobel Prize. Today, more than 70 years later, the Academie has only three women members. Similarly, in the United States, Florence Sabin—the outstanding anatomist—became the first woman admitted to the National Academy of Sciences (NAS) 62 years after its inception.[1] And this year, only 5 of the 59 newly elected members to the Academy were women. One woman member of the Academy has called this situation "a national disgrace" that reflects "persistent bias against women in science at every stage in their careers."[2]

## Historical Perspective

A century of progress in the workplace finds the American woman—although now better educated than her male counterpart underrepresented in the scientific professions and limited in her options for growth and advancement. Certainly, this is an exciting, yet disturbing, time to be a woman in America. Never before have so many opportunities been available to women pursuing careers. And never before have women confronted so many challenges daily in the workplace. Despite the barriers that women face, I believe that we are on the verge of a revolution that will end these outrages and accord women their rightful positions in society's most important endeavors. No one questions that we need more talented women in every field, and especially in clinical practice, biomedical research, and science and health policy. And we need these women not only in *quantity* but also in *quality* positions.

Looking back at U.S. history, we have seen a dramatic shift from an emphasis on brawn to an emphasis on brains. During the past 100 years, output per worker has increased more than 1,100 percent, while the number of hours worked has fallen by 40 percent. This change in productivity has occurred because of human creativity. The ability of the human mind to leverage, by wit and not by weight, human energies into ever greater output has, in turn, elevated our standard of living and quality of life.

What is especially important is that this shift from muscle power to brain power has been a major reason for women's advancement. Indeed, this century of progress has brought us a new concept of what is the "average American." Not long ago, a report in *American Demographics*, entitled "Meet Jane Doe," described today's average American as a 32-year-old married woman, white-collar worker, with about 1 year of college. In contrast, the average American of 1940 was a 29-year-old man, blue-collar worker, with only a ninth-grade education. Fifty years earlier, in 1890, the average American was a 22-year-old single man, farm worker, with virtually no education.

This past century has seen phenomenal advances for women. They now constitute more than one-half of the population, live an average 6 to 7 years longer than men, and make up 45 percent of the civilian work force. Women hold 32 percent of jobs in manufacturing and 62 percent of all service jobs in this country, including more than three-fourths of all health service jobs. Furthermore, current trends suggest that the future work force in America will be more educated, older, and more female than ever before. By the year 2000, most new entrants into the work force will be women, and they will be even more highly educated than either "Jane Doe" *or* their male cohorts.

Women in the 1960s, when I went to college, were outnumbered by men almost two to one.

In 1970, there were only 35 women in college for every 50 men. But women are increasingly attracted to higher education. There now are about 1 million *more* female than male students studying in colleges and universities. This pattern also is reflected in earned degrees, including advanced degrees. In absolute numbers, more women are being awarded Associate of Arts (A.A.), B.S., and M.S. degrees than men; and it is projected that by the year 2001 women will even be earning more doctorate degrees than men.

Not surprisingly, among new entrants to medical school, the number of men has *fallen off* more than 9 percent in the past 5 years, and the number of women has *increased* by about the same percentage. Enrollment of black women is up 23 percent and Asian women is up more than 100 percent. Were it not for this trend in women offsetting falling male enrollment, we might face a brainpower shortage in medicine and biomedical research. These trends apply all across the scientific fields, compensating for what would otherwise be an erosion of the scientific talent base—a talent base that is one of the major ingredients of America's scientific and technological leadership in the world.

### Science, Education, and Women

However, a closer look reveals that this promising trend may not continue. A recent report from the DOE shows that American students do not receive sound science education, especially if they are female, African-American, Hispanic, or poor. Fewer than one-half of the Nation's elementary schools and only about one-third of U.S. high schools have made science a priority in the curriculum.[3]

Although we know that there are no cognitive differences between boys and girls in their ability to do science, after the fourth grade boys consistently outperform girls and the gap widens as they progress in school.[4] One explanation for this may be, according to a recent report by the American Association of University Women (AAUW), that girls and boys do not have equal access to learning. From lack of discussion of women's achievements in textbooks to teachers giving more attention and encouragement to boys, the report describes a pattern of gender-based bias in our schools.

According to the study, the situation is even worse for low-income and minority girls.[5] We must put an end to discrimination against girls and create opportunities in our school systems so that girls can build the self-confidence they need to achieve in science. Furthermore, we must work toward correcting the inherent cultural attitudes that send girls the wrong message about their ability as scientists. At the NIH, we have seen that girls are tremendously interested in science. The majority of students enrolled in our "Saturday Morning School" have been girls in grades six, seven, and eight. They are enthusiastic participants in a successful 6-week educational program designed to spark the interest of young people in science.

What happens to most of these young women as they progress through the educational system? According to a study conducted by the Pew Charitable Trust Science Foundation and researchers at the University of Colorado, fewer women than men declare science as a major in college, and a greater proportion of women abandon science for other majors.[6] As a graduate of Vassar—then a single-sex school—I note that there is an interesting exception to this trend: All women's colleges lose fewer of their science majors to other fields. Based on my personal experience, I believe that women's colleges can engender an environment and a mindset in which there are no barriers based on gender. Such an environment encourages women to pursue "nontraditional" fields like science and medicine.

### Workplace Discrimination

The discouraging news is that all throughout their academic and professional careers in science, women receive more negative treatment than men. Jonathan Cole, coeditor of the book *The Outer Circle: Women in the Scientific Community*, describes what he refers to as positive and negative kinetic reactions or "kicks" that occur at every stage in a career.[7] Women in science experience far too few positive "kicks" —the rewards and recognition that build the self-confidence needed to conduct research and assume positions of leadership.

Women tend to be paid less, promoted less often, and left in nontenure-track positions. It is

not surprising to find that most science faculty members are men. A 1990 report by the NSF shows a total of 151,400 men teaching in science departments at 4-year colleges and universities compared with 34,900 women. Sixty-eight percent of the men were tenured, compared with only 36 percent of the women.[8]

My own field of medicine mirrors the trends found in science generally. Although women now represent 38 percent of medical students, and their academic performance is virtually indistinguishable from men's, women rarely achieve leadership positions on medical school faculties. Indeed, they represent only 21.5 percent of all medical school faculty members, occupying what might be called an academic ghetto in which 49.8 percent are clustered at the assistant professor level, while only 9.8 percent have achieved the rank of full professor. Today, in 1992, no medical school is headed by a female dean, in 1990 there were only two.[9] The glass ceiling remains firmly in place—and latched!

### Strategies for Improvement

There is some encouraging news for those of us in the life sciences, however. The inequities in women's career advancement are lowest in biology and greatest in physics, engineering, and mathematics. It is probably no coincidence that more women pursue careers in the biological sciences than in the physical sciences, engineering, or mathematics. Success leads to success. Clearly, one—but not the only—way to help women in all the scientific disciplines is to increase the sheer numbers of women in these fields.

We need more women in the pipeline. But we also need to develop strategies that will promote equality and ensure advancement for talented women. Institutions must be held accountable for developing sound recruitment, retention, and retraining programs that will provide women in science with opportunities for growth at every level. Periodic followup studies to evaluate the effectiveness of these programs will ensure that women are not merely brought into the system and then, as often happens, drop out or level off, thus failing to achieve their scientific potential.[10]

The NIH intends to be a leader in creating opportunities for women in science. More than ever, I am convinced that a women's health research agenda for the next decade and beyond would be enhanced and gender disparities in medical treatment and research would be reduced by increasing the number of women in leadership positions in teaching, research, and the practice of medicine. We must increase the number of women at *all* levels and in all facets of the research process—as recipients of training grants, as principal investigators, study section members, chairs of study groups, senior scientists, science administrators, and policymakers at the highest levels of NIH.

We have seen some progress. The total amount of research grant money awarded to women has grown much faster than the amount awarded to men, and the average size of research grants awarded to women also has increased faster than the size of grants awarded to men. Since 1981, women's share of research grant money from the NIH has doubled; in fiscal year 1990, women were as successful as men in competing for research grant awards. However, women applied for and received only 19 percent of research project awards. Female applicants for competing projects requested less money than their male colleagues—on average about $30,000 less. Thus, in fiscal year 1990, women received a mere 16 percent of competing funds, and women's applications were less concentrated in grant categories where very large awards are made.[11]

In the intramural program at NIH, women's representation in tenure-track scientific positions has grown from 28.5 percent in 1985 to 33 percent in 1990; the number of women in the Senior Executive and Scientific Services has increased from 14 to 21.[12] But this still is not good enough. I have requested that a special NIH committee collect data on the status of women intramural scientists at the NIH. This committee is charged with generating recommendations to improve women's opportunities and with identifying obstacles to their advancement. One preliminary proposal currently under consideration by the committee is to nominate a female scientist to advise each of the Institute Scientific Directors, all of whom are men. These efforts will raise awareness in the highest levels of the NIH scientific community about problems and issues specific to female intramural scientists.

I also have asked the NIH Office of Equal Employment Opportunity (OEO) to conduct a survey assessing the nature and extent of sexual harassment and discrimination toward women at the NIH. This topic will be considered at a "town meeting" to be held at the NIH on June 29, at which the NIH community—particularly the intramural scientific community—will discuss respect, dignity, and harmony in the workplace. I am personally committed to identifying the causes, manifestations, and consequences of sex discrimination and to finding policy solutions. We must put an end to the negative treatment women receive. We must improve their career advancement and thereby encourage young women, especially, to pursue careers in science and medicine.

### Women as Leaders in Science

In mentioning *young* women I am reminded of a recent article in a special issue of *Time* magazine about women. It described today's young women, disheartened by their mothers' guilt during the 70s and their older sisters' exhaustion in the 80s, as having their own redefinition of the feminine mystique. When asked to describe their futures, these college women said that they want good careers and good marriages and children and they do not want to lie, as their mothers did, when a child's illness keeps them from work. They expect their employers to understand. "Mommy tracks," "Daddy tracks," dropping out, slowing down, and starting over are all options entertained by the younger generation. These are members of a generation that does not want to work 80 hours a week to become leaders in their fields. They do not want to play by the rules, they want a whole new set of rules. As one young woman put it, "In the 50s women were family-oriented. In the 70s they were career-oriented. In the 90s we want balance. I think (we) can do both."[13]

The present and future woman of science probably *can* do both, but she will need role models, mentors, and support from employers to effectively balance the competing demands of family and work life. The woman of science must find time to network, sit on committees, join professional societies, seek opportunities for advancement, and help other women succeed. She must be willing to shoulder the burdens and responsibilities of multiple roles. In return, we who are in a position to do so must change the rules of the game to offer her and her colleagues better access to positions of leadership and authority.

Feminist scholars have rejected traditional concepts of leadership and the exercise of power and have redefined them to include women's experiences. These scholars reject the false notion of leadership as mere command or control. Many women view power as energy, potential, and self-competence, rather than as power over others. Many women seek to achieve and maintain power through personalized, supportive, and cooperative means.[14] James MacGregor Burns, in his book *Leadership*, notes that, "As the concept of leadership shifts to one of leaders engaging and mobilizing the human needs and aspirations of followers, more women will be recognized as leaders."[15]

The time is right for women to be recognized as leaders in science and in every other field of endeavor. The complex nature of science in the 21st century demands the energies and resources of a diverse talent base—one that includes legions of women who are prepared to take on scientific challenges.

In closing, I want to remind you that 1992 has been called "the year of the woman in politics." All of us have heard political pundits refer to 1992 as the year women began to make a difference at the polls. Today, as we gather to consider strategies for enhancing women's access to and advancement in biomedical careers, let us declare 1992 as the year we broke the barriers, changed the rules, and paved the way for greater success for both women and men in *science*. Let us place the highest priority on devising strategies and solutions that will sustain this country's scientific and biomedical preeminence by tapping into the brainpower of women.

To meet the challenge before us will require hard work and commitment. Women *and* men must work hard and be committed. We can begin at this meeting to examine the problem in depth and make recommendations for the NIH, for institutions of advanced learning, indeed, for all institutions involved in the pipeline and in the employment, education, and training of women in the life sciences. Perhaps we can find encouragement in the words of Ruth B. Mandel of the Center for the American Woman in Politics.

In a recent *Life* magazine issue on women in America, which discusses the obstacles to achieving a critical mass of women in politics, she says, "When you stand behind a barrier, it looks very forbidding; it can look indestructible. But you find so often that once you jump the hurdle, the next hurdle and the rest of them don't seem as forbidding. And, in fact, the magic is that they disappear."[16] This observation can apply—and I predict it soon *will* apply—to women in science as well.

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# GIRLS, SCIENCE, AND THE SCHOOLS

*Susan McGee Bailey, Ph.D.*

The American Association of University Women (AAUW) Edcuational Foundation put out a request for proposals to look at all of the data on girls in public schools from preschool through 12th grade. We responded. A team of six at the Wellesley College Center for Research on Women who represent various social science disciplines, economics, policy and child-care specialists, curriculum, and people who had done a lot of research on women in math and science. We worked together with researchers all across the country. We would never have been able to complete the report without the wonderful sharing of resources. We were able to include the latest research; we were able to include reports that are just now coming out in the news and being officially reported. So I do think that what we say in our report, entitled *The AAUW Report: How Schools Shortchange Girls*, is, unfortunately, quite up to date. I say "unfortunately" because much of the news is not good. I will present some of the good news as well as some of the not-so-good news.

First, I would like to emphasize that it is important to look at the issue of educational equity for girls because that has not been done, and we will never achieve a genuinely gender-equitable education for all our students until we look at education from the perspectives of girls as well as boys. Until we do so, we will not think seriously about critical aspects of social development that our culture has traditionally assigned to women but that are equally important for men.

Schools must help girls and boys acquire both the relational and the competitive skills needed for full participation in the work force, the family, and the community. I think it is critically important that we get women into careers, that have been, up to now, nontraditional for them. It is also critically important that we simultaneously get boys and young men more involved in nontraditional careers, allowing them to be more involved with the home and family and in the volunteer and community-building aspects of the community. Current research conducted by Ros Burnett and her colleagues shows clearly that what is good for women is good for men because the greater a father's involvement with his children the better it is for his physical and emotional health.

In this great debate on educational reform, girls have not been a specific topic. Only 4 of 35 national reports on education reform, starting in 1983 with *A Nation at Risk* and going through 1991 with the report of the Rockefeller Commission on Children, make any mention of sex or gender, and only one makes a specific recommendation on Title IX of the Education Amendment of 1972. Until our report came out, the common wisdom was that all of these problems have been taken care of and that we had a totally equitable educational system. And, as is often the case with common wisdom, it is untrue.

In addition to considering the data on girls, we need to look at data on the leadership of public elementary and secondary education in this country. Most people tend to think of schools as a place where women predominate, that this is a woman's profession; and in the United States today 72 percent of public school teachers are women. However, at the same time, it has to be noted that 72 percent of the nation's elementary and secondary school principals are men, and less than 5 percent of superintendents are women. The breakdowns of superintendent data by racial and ethnic backgrounds are minuscule. Not every teacher needs to think about being a principal or a superintendent. However, until we encourage women to move into the leadership roles and decision-making positions, we are not going to have an equitable educational environment and we are not going to have a situation in which teachers themselves are genuinely empowered. Much of the rhetoric of the education reform movement is about empowerment, but not much has happened beyond that rhetoric. One reason

not much has happened is that the people who need to relinquish the power are predominantly men, and the people who would receive it, if it were relinquished, are predominantly women. We need to think about making the balance equitable.

Our report takes a comprehensive look at the existing research. We reviewed over 1,300 research studies, publications, papers presented at scientific conferences, and the few books that had been written on the topic. We looked at everything from preschool through high school. We looked specifically at vocational education and special education. We tracked drop-out figures. We looked at teen pregnancy issues. Our contract called for us to look at only existing research reports. In doing so, we found it almost impossible to find any data that considered racial, ethnic, and social class along with sex differences. Therefore, one of our team members, Lynn Burbridge, conducted her own analysis of national data to examine the interrelationships among race, ethnicity, socioeconomic class, and sex.

Today I will focus on the research related to the participation, achievement, treatment, and plans of young girls in the areas of science and mathematics. I will present specific statistics on science and math then move to more general information on curriculum content and classroom interaction patterns.

In the sciences, there is a decided gender gap as early as junior high school. Boys' scores increase on national tests such as the NAEP, and girls' scores decrease. In terms of the mean number of science courses that students take, from 1982 to 1988 boys took a few more science courses than girls and currently that gap has not changed. The gap is not large, and, in fact, is equitable in chemistry and biology classes with more girls enrolled in biology II. But in more advanced courses, chemistry II, physics, and advanced physics, boys take far more courses than girls. So, although the general pattern does not show much difference, the specifics do.

Put these facts in the context of what is happening to enrollment in scientific and technological fields at the college level: the numbers are going down, even among men. Fewer people are taking engineering; in fact, the drop in enrollment is greater among men than among women, but there are significantly fewer women enrolled to begin with. In a study of the college plans of high school seniors who have taken calculus and physics and have done well in these courses, it was found that fewer than 20 percent of the young women are thinking of majoring in science or engineering, but over two-thirds of the young men are considering this option. So, while the course-taking patterns at the high school level may be slightly changing, there is little progress in how people think about career patterns.

There is some good news. It is not in the sciences, however, it is in mathematics. The gender gap in mathematics was a major problem and a topic of discussion during the 1970s and the early 1980s; a lot of attention was paid to it and it has improved. Girls are still not scoring as high as boys on the Standard Achievement Test, but in terms of the number of math courses taken at the high school level girls and boys are much more equal. The problem and big drop-off point occur at the calculus level. Girls take math through algebra, but they stop at calculus. In terms of math majors in college, there is an equality—hardly anyone is majoring in math.

The popular idea still exists that girls do better than boys in verbal areas; hence, many people say that if girls are not going into science or math it really is not such a problem because think how well they are doing in verbal areas. Boys and girls are doing about equally well in verbal areas. On some national tests, boys are outscoring girls. On other tests, girls are doing a little better, but the mythology still persists that girls are doing a lot better than boys. This assumption that somehow there is overall equity because girls have the verbal field of expertise and boys have math and science expertise lends credence to the idea that we do not need to worry so much about math and science. This supposition nurtures the traditional stereotype that math and science are not as important for girls as for boys.

There is still the widespread assumption that there is a math gene. Six months ago *USA Today* published an article on the subject that supported the idea that abilities in math were inherited: It was in the genes. This is contrary to all the research evidence, which shows that girls are taking more math courses now than they were 10 years ago, that they are doing better in them, that their scores on national tests are increasing, and that when girls and boys have equal prepara tion and training on spatial relations tasks they

do equally well. We do not change genes in 10 years. I find it infuriating that when I talk to reporters about these improvements they say, "Well, yes, but Susan that is not news." If there is a gene or something and it is sexy—that makes a good headline.

In the report we also looked at curriculum issues, and curriculum issues are trickier to get a handle on. When you are looking at how many students are enrolled in math or enrolled in science or what test score they got on a particular test, you can quantify it exactly. Curriculum is a little trickier.

But curriculum is the central message-giving instrument of the school. It says to students, "This is what we think is important. This is what the adults in your life think you should know." And if a female student does not see herself reflected in those materials, she gets a pretty clear message that she is not important. And if she does not see herself as able to choose from a variety of things and participate in a variety of careers, if she gets the message of limits all the way through school from the earliest grades, she assumes that she should not be doing those things.

When women talk about the underrepresentation or exclusion of women from curriculum materials, whether in what is written or what is shown in pictures, they are worried not only about women and girls but also about boys because boys must see images of girls and women doing a variety of tasks if they believe that the girls in their class will be able to do those jobs as women. So again, it is a question of gender equity that cuts both ways.

One of the most poignant comments that we found in reviewing research and interviewing students in the process of doing this report was made by a 12th-grade African-American girl in a New York City high school, who said, "In 12 years of school I have never learned anything about myself."

Science materials are assumed to be somehow more objective, scientific, clear. They are not so fuzzy as history or English; they just present the data and there is no question of stereotyping in those science books. We all know that that is not necessarily the case. The American Association for the Advancement of Sciences (AAAS) has a new project, 2061: Developing Curriculum Materials, and they put equity at the center of their goal and creating materials that will be meaningful to students. Nonetheless, I have to say that, so far in the majority of those materials that I have had a chance to look at, women do not seem to be any more visible than they were in older materials. So I think we still have a long way to go.

I have to tell you a story about reading lists that were handed to me at a meeting in Chicago in February shortly after this report came out. A woman who was at the meeting turned to me and said, "These two reading lists were just proposed to our board of education last night for approval. They seem to me to be a little stereotyped. What do you think?" She handed me two reading lists. One said "For Macho Dudes Like You," and it featured a most unattractive man on the cover with bulging muscles, hair sticking out, and wearing a torn shirt. The other said "For Girls Only," and there was a little girl with her arms crossed sitting very passively. On the two lists, about one-third of the books were exactly the same. The teacher who had presented it to the board for approval had said that this would be a way to get students interested in reading. It may have gotten a few students interested in reading the reading list, but I don't think that that was its major function. I think its major function was reinforcing some very traditional and dangerous stereotypes about students. And I do not believe for a moment that the teacher involved was doing this in any deliberate or conscious way. She was thinking of the best interests of her students, and I use "she" because it was a woman who developed those materials. This is a story that you would have expected to hear maybe 20 years ago, so we have a long way to go.

Another body of research that is critically important has received a fair amount of attention in the cartoon strips. The following is from a *Doonesbury* cartoon:

> How is nursery school going, honey?" "Well, okay I guess. But I don't get any attention from the teacher—I don't get to say anything." "What do you mean?" "The dorky boys get all the attention. Mrs. Jasper just isn't fair about letting the girls answer questions." "Hmm, maybe I should go and talk to your teacher." "She will never listen to you! Send dad."

Research over the last 20 years consistently shows that from elementary school classrooms to university lecture halls, boys and young men receive more attention from teachers than do girls. One explanation that people often offer for this phenomenon is that, well, boys demand more attention. And I think that is absolutely true—they do. But the research also shows that even when boys are not demanding attention, teachers of both sexes are still more likely to call on a boy, draw a boy out, ask him a followup question to a particular answer, and challenge him intellectually.

Twelve years or more of that sort of experience in classrooms has a very significant effect. It tells girls that they should be polite and quiet. It tells boys that it is perfectly all right to get lots of attention and, in fact, to be aggressive about getting the attention. Do I want to turn girls into people who run around raising their hands every minute and asking for lots of attention? Not necessarily, but I think it is important that we help boys learn to listen and to think about what they are going to say before they say it.

Some of the research on this issue of attention to boys and participation in classrooms has been done in science classrooms, and some of that research is particularly discouraging. In one research review, 72 percent of the science experiments were done by boys. Chemistry classes have been repeatedly reported to be particularly problematic. An article that appeared in a recent issue of *Education Week* reported on a study done by Valerie Lee at the University of Michigan. Chemistry classes generated 66 percent of all sexist incidents. One incident occurred in a chemistry class in which there were nine boys and five girls. A male teacher addressed only the boys in describing an experiment to be done by students. A girl in the front row asked for clarification, was ignored, and repeated her question. She had learned that you have to keep after it, you have to repeat it. The teacher was clearly exasperated, which is not often the response when boys want to ask another question, and tossed water on the girl and her desk; everyone laughed and nothing was said by the teacher or by any of the students. Well, that is literally throwing cold water on someone. The show of preference is usually not that extreme but that incident is not an isolated one. There are many research studies indicating that, particularly in science classes, girls do not get an opportunity to participate.

A quote that I think is really wonderful is from a student who took part in an out-of-school science program called "Eureka!" She says, "In Eureka science we get to do experiments every day and discuss and help out our peers. But in school science you can't talk among your friends about the work or you will get into trouble. You can't experiment every day in school because you are supposed to have covered a certain amount of work by the end of the year."

I do not think it is exclusively young girls and women who enjoy working together and taking part in science experiments, but it is girls over and over again who say that that is what they like best about science. At Wellesley we have a project called "Pathways" that is studying whether young women who are coming into the college are interested in science. If so, why? If not, why not? What is it that they like about their science experiences? Overwhelmingly, what they like about their experiences in science is the opportunity to engage in hands-on work in the science lab.

We have to make a specific effort to encourage young girls from the earliest ages to take an active part in science classrooms. Boys tend to come into elementary school and to continue on through high school with more out-of-school experiences that are directly related to many parts of academic science. They play with tools. They have mechanical toys. They are encouraged to do these things.

Research has shown that when girls and boys are given an opportunity to study a lesson beforehand and to do some of the experiments before discussion occurs in class participation is much more equitable. Girls and boys participate; girls feel that they know something about it. They are a little more aggressive in putting forth their ideas. When they do not have that experience, that hands-on knowledge that they can do it, they are much less likely to put themselves forward. They need to be sure that they know what they are talking about. I do not think that is a negative trait at all. I think that it is a good thing and that we need to encourage more of that kind of opportunity for all our students, but particularly for girls.

I would like to end with a quotation that was from *Parade* magazine last February because I think it says a lot about the underlying problem

that we still have to deal with in terms of women, not only in science, but in all kinds of professional careers where there is an opportunity to take a leadership role. A junior in high school said, "Sometimes I act like I am not as intelligent as I really am. I feel that if guys knew that I have a 4.0 average they would be intimidated." Then she went on to say, "I have found this to be true." I think we have a budding scientist here; obviously, she had looked around and studied more than just herself.

I think our task in the next few years is to make sure that none of our young women in our schools have to say that they deliberately act dumb sometimes. Thank you very much.

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*Public Health Service*
*March 1990–June 1993*

I am impressed at the range of experience of the women at this meeting; I believe that there is such strength here, such accumulated experience, such intelligence, that despite serious obstacles, women will not have to worry about full and complete access and achievement in biomedical careers in the 21st century.

I feel that I am a very bona fide member of this women's group. I am a pediatrician by specialty, and I know the problems of women in medicine; I also know the problems of women in biomedical research. I was Deputy Director of the National Institute of Child Health and Human Development (NICHD) and cochair of the Women's Health Issues Task Force, so I know the problems of being a high-ranking staff member in one of the NIH institutes. Every day I learn more about being a woman and being Surgeon General.

I am also a certified member of a minority group and can add enlightenment about that issue as well. The Hispanic population is growing and will soon be the largest minority in the country, but the number of Hispanic physicians remains the same. Right now, Hispanics have more than their share of problems and less than their share of opportunities. Latinos are the most likely to have low educational attainment. Although I have been privileged in many ways, successful beyond my dreams, never think for a moment that I will forget where I came from on my way to the top. I look at a full ethnic mix here today and I know that each of us who represents a minority group could add their experiences to enlighten us.

I also know that despite our greater numbers—127 million—women are still a minority group as well. Women in biomedical careers have, in a sense, been immigrants in a man's world. Now it is truly time for not just assimilation but for adding to the dominant culture as well. However, we must examine our strategies. Do we seek to evade our femininity or to emphasize it? In some societies, some women still feel that they should distance themselves from their gender. They are doctors, not female doctors; they are lawyers, not female lawyers. There is an analogy in minority groups that have a lot of experience with hyphenated names: African-American, Hispanic-American, Asian-American, etc. Is this really any different from saying "female scientists"?

I think that we have to advance in stages. First, we must emphasize being women to make the statement; then as we make our gains, this distinction will pass as totally unnecessary. I, for example, was born a woman, and a Hispanic, and then became the Surgeon General. For now, I acknowledge these descriptors, while awaiting the day when it will be so commonplace to have women and minorities as Surgeons General that it will not even be worth mentioning the descriptors any more. I found very quickly after my appointment as Surgeon General that I neither could nor should distance myself from my gender or my ethnic status. It was very important that I be a female, Hispanic Surgeon General. Not only did it give me contact with a constituency, but also it gave me strength and a mission.

Nonetheless, I am Surgeon General for all Americans, not just women or Hispanics. In a sense, in addition to the education I received in school, these are subjects I studied in the College of Life. I am an expert in these subjects—and never underestimate this expertise; each of us has this expertise. As Surgeon General, I have patterned my agenda after my heart and my training. I am active on behalf of children—my issues are underage drinking, smoking cessation, women, adolescents, and children with AIDS. I have talked and talked about women and violence. I have continued the fine work done by previous Surgeons General on increasing organ transplantation. I have made improved immunization for

childhood illnesses a major focus, and I am very proud of what my very small office—almost all women—has achieved. I have traveled to more Indian reservations than any other Surgeon General, more small towns to speak to high school students than even begins to make sense by some people's standards. I visit the poorest areas in town.

A special concern of mine is women's health issues. To this I say: no more paternalistic research. For drugs that affect women, no more studies of only men. No more fractionating a woman and prescribing for one part of her body without concern for the whole. No more ignoring differential statistics about cardiac surgery or differential outcomes of cardiac surgery. No more aspirin studies on 22,000 men and no women. No more longitudinal studies of aging conducted only on men. No more female urological studies conducted in veterans hospitals—where the population is clearly predominantly male. No more questions about whether women will comply with research protocols. No more facile excuses using the "complexity" of women's hormonal status. This paternalistic approach to medicine is bad not only for women but also for science.

Too many women are dying of heart disease, stroke, or cancer—particularly breast, cervical, and lung cancers; and too many are suffering from depression and other mental illnesses. Too many children are neglected today, not because women are neglecting them, but because society has so neglected them that even the constant, reliable, and self-sacrificial care of women has not counteracted the neglect of society. Women are dying of AIDS—more than 3 million worldwide, and children are being left in institutions, or worse, left without parents. We need to speak to such issues.

Many medical problems reflect a lack of empowerment of women in society. Can women really ask for safe sex or control sexual practices if they are totally or seriously economically dependent on men? Women have been told to be monogamous, but can we, in turn, expect it, or worse, demand monogamy without fear of abandonment? It is at times like this that fear of abandonment overcomes fear of infection. And what about violence against women? The physical battering and the physical injuries that women suffer every day in this country reflect their overall social situation. These are natural issues that concern us.

There are hopeful signs in the lower grades that girls are studying in equal and even greater numbers than boys; but, do we see women achieving their rightful standing in the biomedical sciences, or for that matter in academia? I expect the best of and for women; I expect women to have the perspective of the human family and to gain accordingly. Think for a minute of how bad it is that I was the first female Surgeon General. Think how recently we heard about the first female astronaut, the first female Supreme Court Justice, the first female vice-presidential candidate. Even the first female director of the National Institutes of Health. That we are still having a first woman anything is shocking. It is time for the appointment of a qualified woman to be so commonplace that it will boring. We have been a little preoccupied with following and excelling men—for good historical reasons, but now we have to find a new female model. We are all standing on the shoulders of many who have gone before us: Elizabeth Blackwell, Madame Curie, Ruth Kirschstein, Maxine Singer, and all the brilliant and accomplished women before us.

It is time to fold up the barriers to women in biomedical careers and put them outside the door. We need clear thinking, an absolute end to any self-limiting attitudes, a real appreciation of the intellect, training, and accomplishments of women in these fields. We need an insistent—even to aggression—self-appreciation of our worth. I think it is time for a little rage—a rage that is called PMS in women and healthy aggression and initiative when it emanates from men. Women share the work as well as the problems of the world. We all know the paucity of women in high positions, and we know that it is not due to a lack of innate ability or training. It is time for more enlightened equality. Women may be more complex, but it is definitely time to drop the weak justifications for holding women back. I have always liked the saying, some say it is Chinese, some say Native American: "Women hold up half the sky." I say we hold it all and the time has come to tell it to the world!

The future of women in biomedical research, the future of NIH, the future of American biomedical research, the future of the Federal effort for better health—these depend on you. You must

maintain your commitment to recruitment of women, fair treatment of women, and advancement of women. The role of women—in the total range of jobs, from animal caretaker, to administrative assistant, to engineer, to security positions, to scientists, to clinician—will predict how far we as a Nation go and how well we will do. To be successful all women of all ages should take a broader interest in women's health as a whole—not in parts. Most important, the agenda should be built on true awareness of the importance of women *per se* and also on women as part of the human family.

I think that the advancement of women and the health agenda of the 1990s are one and the same. The empowerment of women must incorporate recognition of the serious problems faced by women, or any proposed change will be just an isolated change. Obviously, to succeed today, women have to be both feminine and feminist, active and activist. They must press for solutions as well as take part in creating and carrying them out. But when solutions are proposed, we must not sit back.

We must watchdog the process and participate in the outcome. It must be remembered that any successful effort to improve women's health will have to include women as equal partners in the development of policies pertaining to them and to their families. As Susan B. Anthony once said, "Woman must not depend solely upon the protection of man, but must be taught to protect herself."

Those of us who have the privilege of speaking for those who cannot speak for themselves have the ultimate responsibility to speak loudly and clearly. It is important that, as women, we stay together, work together, and hold ourselves up to be lifelong learners and the keepers of what the future holds for us. We also shall overcome.

# WOMEN IN BIOMEDICAL CAREERS
# MINORITY WOMEN'S PERSPECTIVE

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## Introduction

Within the broader topic of women's advancement in biomedical and health science careers, there are a number of unique issues for minority women that deserve special attention. The particular obstacles that many African-American, Asian-American, Native American, Latino, and other minority women face are closely intertwined with their racial and ethnic heritages and their deeply held cultural and community values and characteristics. Some of these values and characteristics are common to more than one group; others are unique to certain groups. Even within ethnic groups—Asians, Native Americans, or Hispanics, for example—there are distinct differences among those from various national or tribal heritages.

If women from minority groups are to achieve true equality in the academic and institutional world, then the issues that confront them must be considered. A number of these issues are discussed here, and they are accompanied by a series of recommendations for action to be taken by both institutions and individuals.

### *A Two-Pronged Bias*

The common ground of gender is only one aspect of a two-pronged institutional bias that minority women face.[1] Gender issues may serve as a rallying point across racial and/or ethnic lines, but minority women cannot necessarily transcend longstanding racial and/or ethnic issues. From a minority group perspective, it is not possible to believe that the perceptions concerning or approach to overcoming gender bias from deep within the majority white culture could be the same as the perceptions and approach from the periphery. In the former case, the discussion of equity is a negotiation among cultural equals, among people who have their basis in and would preserve a common language and common norms and values. For minority women, however, it is an argument, however civilized, among people who neither speak a common language nor have the same stake in the majority culture.[1,2,3] For these women, distanced from the majority culture by history, language, religion, and other components of their race and ethnicity, discussions of equity may need to begin on entirely different premises.

To overemphasize common ground on the basis of gender suggests that minority women suspend their perception of and desire to overcome biases related to race and/or ethnicity for the larger good of women overall. This would mean betrayal of the support systems that the African-American, Hispanic, Native American, Asian-American, and other minority communities outside the majority offer to men and women alike, and would inevitably cause polarization, that is, a need to choose between racial and/or ethnic issues and women's issues.[1] For many members of minority groups, the struggle against racial and ethnic discrimination is the first battle to be waged.

Some aspects of racism and sexism are similar. However, racism and sexism are separate forces that operate independently.[4] White women have the luxury of being able to ignore racial bias, and are relatively free to concentrate on articulating and forcing change within gender issues. In contrast, women of color may experience both racism and sexism in an additive fashion. When a white woman has analyzed a situation and concluded that sexism is not an issue or, even better, when she has successfully overcome sexism-related problems, the minority woman must continue to assess the situation for problems related to race and/or ethnicity. Therefore, every battle is two-pronged, and the uncertainty that minority women face as to when either or both battles must be fought augments the need for vigilance and increases the drain on psychological and coping resources. Add to this the interaction between gender and race, that is, the fact that in white institutions the joint effects

of racism and sexism may result in women of color having unique experiences that are not shared by either white women or men of color, the ability of women of color to function in a way that builds on prior cultural learning, simple social politics, or professional accomplishments may be extremely compromised.[1,5]

Although the women's rights movement is characterized as having benefited from the movement for civil rights,[1,4] participation of women's rights advocates has not been a visible feature of the struggle against racial discrimination. White women may be perceived by women of color as having exploited, if not coauthored with white men, social stratification based on race.[2] Minority women, by sheer experience, must be vigilant for discrimination from majority women at the same time that they are attempting to work with them on gender issues. Thus, to the extent that white women are members of the dominant group through which racial discrimination is perpetuated, a call to support the cause of women overall may be viewed with ambivalence, or even negatively, by women of color.

As a part of the dominant culture, white women have the advantage of knowing this culture as well as the obligations associated with being a part of it.[1] Although role definitions and privileges are clearly gender stratified, the dominant cultural framework is common to white men and women. This framework includes a particular worldview as well as specific norms and values related to what is considered appropriate social behavior, self-expression, self-reliance, family and children, competition, and an ethnocentric perspective on persons of color as inherently lower than whites in the social hierarchy.[2]

Minority women experience constant pressure to assimilate toward this dominant culture; at the same time, the obstacles to career advancement that are placed before them are subtle and not-so-subtle reminders that they are "different."[1,3,5] For example, many of the fundamental cultural values held by women of Asian heritage revolve around traits of deference, the paramount importance of family and community, social order, and avoidance of "loss of face," qualities that are very different from those espoused by the majority culture. Deference is typically manifested by unquestioned loyalty, dedication, and commitment to the academic institution. Attached to this deference is the belief of "honor by association" with the system or institution, and the conviction that hard work brings desired and deserved recognition. However, while Asian-American women may believe that this philosophical stance will eventually activate rewards or incentives in the system, their contributions often go unnoticed, are minimized, or are taken for granted. This problem becomes especially pronounced with the passage of time. Similarly, Asian Americans traditionally place priority on the family and community above individual achievements and on the value of working toward the "common good." This is in juxtaposition to most academic or scientific settings, which function by breeding competition and building incentives primarily at the individual level. As a consequence, Asian-American women scientists make superb team players and march toward missions and goals that can be owned by their institutions, but at the price of individual invisibility and foregone personal recognition.

Social class is also another important influence on the position of minority women relative to white women in biomedical careers. Minority faculty are more likely than their white counterparts to be from economically disadvantaged families.[6] Attaining a doctoral degree and a position on a university faculty are unique in socially disadvantaged groups, regardless of gender, and may tend to isolate minority faculty within their reference group. However, changing to a more middle-class reference group may not be the answer. Compared to whites from lower income families, members of minority groups may be expected to or may perceive a need to remain tied to their racial and/or ethnic reference group or support system across class lines.[2]

Some data indicate that representation of minority women in medical schools is increasing at a faster rate than for nonminority women and minority men.[6] This suggests that the interaction of racism and sexism may be advantageous in some circumstances. If so, ironically, this could create distance between women of color and white women, while also aggravating conflicts within minority groups. There are other potentially negative consequences to this seemingly positive development as well. Assignment of a minority woman to an academic committee may satisfy a number of criteria and quotas for the institution, but it puts the woman under enormous

pressure to do an exceptional job not only because of her innate standards of quality but because, in large part, she is representing her culture, race, and gender. To do a poor job welcomes continued stereotyping and discrimination; to do an exceptional job welcomes even more committee assignments, which can be a time-consuming distraction from individual scientific and academic endeavors and can contribute to burnout.

***Recommendations***

Special attention to the issues of minority women is an essential element of advocacy for women overall. The key issue is the need to overcome *any* treatment based on ascribed status, for example, gender, color, heritage, or class. The recommendations below focus on the need for institutions to provide an unequivocal commitment to the special considerations of minority women in biomedical careers. In so doing, the differences between the issues for minority women at predominantly white institutions and those at historically minority institutions should be recognized. These recommendations may include, but are not limited to, the following.

- Trustworthy mentoring and guidance should be provided to help minority women achieve solid footing in an environment where they are in two important pools for faculty recruitment, that is, race and/or ethnicity and gender, and may therefore be susceptible to both positive and negative market forces.
- Clear institutional policies should be implemented to prevent minority women from the threat of having an inappropriately high load of service activities (formal and informal). Such a threat exists because, due to the small size of the available pool of minority women for faculty service and the politically more intense nature of minority versus gender affirmative action, more numerous opportunities for visibility and influence may exist compared with white women; however, such service activities lead almost inevitably to insufficient academic productivity.
- To the extent that excess visibility and expectations will unavoidably apply to minority women in predominantly white institutions, these should be codified so that resources to facilitate meeting these commitments can be provided (e.g., adequate salary, support staff, study leaves or teaching release time; and funds to attend and present at meetings of both minority and women-oriented scientific or academic societies, as well as mainstream societies).
- Early appointment of minority research faculty into administrative roles should be approached with full consideration of the possible disadvantages to the faculty member in question and to the field (e.g., insufficient time for teaching or research and increased visibility for any difficulties or failure).
- The affirmative action climate should not assume that women and minorities are interchangeable for affirmative action purposes. This defines the needs of women from the dominant culture in a way that is competitive with minority issues and puts minority women in the position of either ignoring important racial and/or ethnic issues or having to challenge the majority view from an already vulnerable position.
- Minority women should not be stereotyped as to their views and needs concerning the balance between racial and/or ethnic and gender issues or their willingness to provide service in these areas by offering nonthreatening opportunities for minority women to express their professional needs and preferences in this regard and by respecting these preferences.
- Full use of special programs to include other minority men or women scientists in the academic environment should be made, particularly where minority women are isolated on predominantly white faculties. Release time *must* be provided for these additional responsibilities and duties. Given the very small pool of minority women in biomedical careers, faculty exchanges in the form of visiting sabbaticals, lectureships, and service on institutional advisory boards and committees are ways to increase the visibility of minorities in the environment, foster a more supportive climate for resident minority faculty, and compensate in part for the likely lack of mentors in-house. Most people mentor within a race and/or ethnic

group, if not gender, and minority faculty to serve as mentors may be scarce.

- Predoctoral and postdoctoral programs or other mechanisms should support minority women faculty development in ways that do not penalize women regarding the tenure clock; these programs should be used only as a route to eventual tenure leading to permanent faculty positions.
- Statistics that document progress and equity (or lack thereof) should be collected separately for minority women faculty members so as to support the need for special programs and policies. In addition to data on African Americans, data should be collected separately on those groups commonly noted as "other"—Native Americans, Latinos, Asian Americans—in order to more accurately and completely document progress and equity.
- The pathway to promotion and tenure for all faculty should be clarified. This will have the greatest benefit for the most marginal members in the system, that is, those who are least likely to be mentored or to have had opportunities to learn the system.

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VOLUME II

SUPPLEMENTARY REPORTS

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For women scientists who have established careers in biomedicine, the gradual awakening to the existence of or the challenge of a "glass ceiling" in the scientific community has been long overdue. The disparities in the experiences of women are most evident among working professionals in their positions, salaries, and tenure status. Findings in these areas have brought renewed attention to pervasive problems but do not explain the *causes* of inequality. Rather, they lead us to more fundamental questions about the way women scientists are prepared and supported in our educational system.

The Women in Biomedical Careers: Dynamics of Change, Strategies for the 21st Century Workshop was developed to address the full range of issues that affect the development of women scientists. Central to the workshop was a recognition that the successful training and promotion of women in the biomedical sciences is a continuum—beginning at the formative stages of a woman's education.

Indeed, the glass ceiling appears to be founded on differential treatment and learned gender roles. It is believed that lower participation rates in courses and majors in mathematics and the sciences are a major factor contributing to the underrepresentation of women in the scientific workforce.[1] Small differences in participation and interest in these subjects appear first at the elementary and middle school levels[1] (Table 1). By the time young women finish high school, their mathematics scores on the Scholastic Aptitude Test (SAT) average a full 40 points lower than their male classmates (Table 2). This score may reflect course-taking behavior or a problem with the test itself, but the score of the test becomes a gatekeeper to scholarships and programs, thus disadvantaging young women further.

Gender differences in early science and mathematics scores can be attributed to a number of factors. Traditional views that have produced theories of a male "mathematics gene" hold

**Table 1. Precollege Mathematics and Science Achievement**

**Overall Mean Scores**

| Age Level and Test Year | Total | Male | Female | White | Black | Hispanic |
|---|---|---|---|---|---|---|
| Age 9 | | | | | | |
| 1973 | 219.1 | 217.7 | 220.3 | 224.9 | 190.0 | 202.1 |
| 1978 | 218.6 | 217.4 | 219.9 | 224.1 | 192.4 | 202.9 |
| 1982 | 219.0 | 217.1 | 220.8 | 224.0 | 194.9 | 204.0 |
| 1986 | 221.7 | 221.7 | 221.7 | 226.9 | 201.6 | 205.4 |
| 1990 | 229.6 | 229.1 | 230.2 | 235.2 | 208.4 | 213.8 |
| Age 13 | | | | | | |
| 1973 | 266.0 | 265.1 | 266.9 | 273.7 | 227.7 | 238.8 |
| 1978 | 264.1 | 263.6 | 264.7 | 271.6 | 229.6 | 238.0 |
| 1982 | 268.6 | 269.2 | 268.0 | 274.4 | 240.4 | 252.4 |
| 1986 | 269.0 | 270.0 | 267.9 | 273.6 | 249.2 | 254.3 |
| 1990 | 270.4 | 271.2 | 269.6 | 276.3 | 249.1 | 254.6 |
| Age 17 | | | | | | |
| 1973 | 304.4 | 308.5 | 300.6 | 310.1 | 269.8 | 277.2 |
| 1978 | 300.4 | 303.8 | 297.1 | 305.9 | 268.4 | 276.3 |
| 1982 | 298.5 | 301.5 | 295.6 | 303.7 | 271.8 | 276.7 |
| 1986 | 302.0 | 304.7 | 299.4 | 307.5 | 278.6 | 283.1 |
| 1990 | 304.6 | 306.3 | 302.9 | 309.5 | 288.5 | 283.5 |

Source: National Science Foundation. Women and minorities in science and engineering: an update. Washington, DC, 1992.

little ground scientifically. However, the biases caused by such theories may themselves explain gender differences. Studies of factors such as teaching practices, biases repeated in textbooks and teaching materials, and opportunities both in and out of school for hands-on experience have shown that all of these variables can influence young women's demonstrated achievement in mathematics and science.[2]

It is not surprising that females, more than males, have been found to doubt their competence in mathematics and science. The ETS reports that the gender difference in self-perception (of mathematics ability) increases with age.[2] There is also evidence suggesting that gender stereotyping appears to influence whether girls excel in a particular subject, and that this alone can be a critical factor in achievement. Girls who reject traditional gender roles have higher mathematics achievement than girls who hold more stereotypical expectations.[2]

But once in college, women are actually more likely to select a science major than men—25 percent of females compared with 22 percent of males. In the biological sciences, women are awarded slightly more than 50 percent of undergraduate degrees. However, at the graduate level, female enrollment in biological science programs slips to 46 percent of the total. This downward trend worsens dramatically at the doctoral level where women are awarded only 37 percent of all degrees.[1]

Despite the statistics on the number of women doctoral graduates, critics have argued that women have, indeed, succeeded in establishing themselves in the biomedical professions. In reality, this success has occurred without parity in salaries or status and has been concentrated in disciplines and professions that have traditionally been reserved for women. Among traditionally female professions, such as registered nurse, women make up 95 percent of the work force.

**Table 2. SAT Score by Sex: 1981–1991**

| Sex and Racial/Ethic Group | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **Verbal** | | | | | |
| Total | 424 | 426 | 425 | 426 | 431 | 431 | 430 | 428 | 427 | 424 | 422 |
| Male | 430 | 431 | 430 | 433 | 437 | 437 | 435 | 435 | 434 | 429 | 426 |
| Female | 418 | 421 | 420 | 420 | 425 | 426 | 425 | 422 | 421 | 419 | 418 |
| White | 442 | 444 | 443 | 445 | 449 | NA | 447 | 445 | 446 | 442 | 441 |
| Black | 332 | 341 | 339 | 342 | 346 | NA | 351 | 353 | 351 | 352 | 351 |
| Asian | 397 | 398 | 395 | 398 | 404 | NA | 405 | 408 | 409 | 410 | 411 |
| Native American | 391 | 388 | 388 | 390 | 392 | NA | 393 | 393 | 384 | 388 | 393 |
| Mexican American | 373 | 377 | 375 | 376 | 382 | NA | 379 | 382 | 381 | 380 | 377 |
| Puerto Rican | 353 | 360 | 358 | 358 | 368 | NA | 360 | 355 | 360 | 359 | 361 |
| Other Hispanic | NA | NA | NA | NA | NA | NA | 387 | 387 | 389 | 383 | 382 |
| | | | | | | **Mathematics** | | | | | |
| Total | 466 | 467 | 468 | 471 | 475 | 475 | 476 | 476 | 476 | 476 | 474 |
| Male | 492 | 493 | 493 | 495 | 499 | 501 | 500 | 498 | 500 | 499 | 497 |
| Female | 443 | 443 | 445 | 449 | 452 | 451 | 453 | 455 | 454 | 455 | 453 |
| White | 483 | 483 | 484 | 487 | 490 | NA | 489 | 490 | 491 | 491 | 489 |
| Black | 362 | 366 | 369 | 373 | 376 | NA | 377 | 384 | 386 | 385 | 385 |
| Asian | 513 | 513 | 514 | 519 | 518 | NA | 521 | 522 | 525 | 528 | 530 |
| Native American | 425 | 424 | 425 | 427 | 428 | NA | 432 | 435 | 428 | 437 | 437 |
| Mexican American | 415 | 416 | 417 | 420 | 426 | NA | 424 | 428 | 430 | 429 | 427 |
| Puerto Rican | 398 | 403 | 403 | 405 | 409 | NA | 400 | 402 | 406 | 405 | 406 |
| Other Hispanic | NA | NA | NA | NA | NA | NA | 432 | 433 | 436 | 434 | 431 |

Source: National Science Foundation. Women and minorities in science and engineering: an update. Washington, DC, 1992.

In traditionally male professions the percentage of women in the work force is nearly the inverse: 10.1 percent in dentistry, 20.8 percent in veterinary medicine, and 36.8 percent in pharmacy.[3]

Female scientists are less able to find work in their field and are more likely to be underemployed in the positions that they do attain. According to Bureau of Labor Statistics data, women represent 37.9 percent of all biological and life scientists.[3] In 1986, the unemployment rate for women in science and engineering fields was 2.7 percent versus 1.3 percent for men, and the underemployment rate was 2.6 percent versus 1.0 percent.[1]

As a group, female scientists lag behind men in their levels of pay and in their advancement to senior positions; among the most senior life scientists, men's salaries are typically 12 percent higher[1] (Table 3). In academic institutions, the proportion of women in the biological sciences gets smaller as rank increases. This is most dramatic at the rank of full professor, where female biological scientists hold only 15 percent of the positions[3] (Table 4).

Even more disturbing than the disparities experienced by women as a whole are the challenges presented to minority women in the sciences and biomedical professions. Unfortunately, assessing the extent of these inequities is itself a challenge because few data are available that specifically describe the employment trends of women in each minority group. Data do show, however, that African Americans and Hispanics of both sexes each make up only 5.2 percent of

**Table 3. Women's Salaries as Compared to Men's Salaries, by Field and Level of Degree**

| Field and Sex | Total Employed | White | Black | Asian | Native American | Hispanic |
|---|---|---|---|---|---|---|
| Total, all fields | $38,400 | $38,700 | $31,500 | $39,100 | $41,000 | $34,600 |
| Male | 39,800 | 40,000 | 33,500 | 40,700 | 42,600 | 36,600 |
| Female | 29,900 | 30,200 | 26,200 | 30,100 | 29,800 | 25,200 |
| Scientists, Total | 35,700 | 35,900 | 29,000 | 37,000 | 40,500 | 30,600 |
| Male | 38,000 | 38,100 | 31,400 | 40,500 | 44,100 | 33,900 |
| Female | 29,000 | 29,400 | 25,400 | 28,800 | 29,100 | 22,900 |
| Physical Scientists | 40,700 | 40,900 | 35,600 | 39,300 | 63,400 | 41,300 |
| Male | 42,000 | 42,000 | 39,300 | 42,200 | 63,400 | 43,100 |
| Female | 31,300 | 31,800 | 24,300 | 31,400 | — | 33,900 |
| Mathematical Scientists | 39,800 | 40,000 | 37,000 | 38,500 | 22,500 | 38,700 |
| Male | 42,500 | 42,800 | 38,400 | 39,300 | 19,900 | 42,100 |
| Female | 31,000 | 31,000 | 32,900 | 30,600 | 25,000 | 31,000 |
| Computer Specialists | 37,300 | 37,500 | 32,200 | 37,400 | 39,300 | 31,500 |
| Male | 38,900 | 39,000 | 34,200 | 39,600 | 42,400 | 33,800 |
| Female | 33,200 | 33,700 | 29,300 | 30,800 | 20,500 | 25,800 |
| Environmental Scientists | 37,500 | 37,600 | 31,800 | 40,600 | 27,000 | 40,500 |
| Male | 38,400 | 38,500 | 29,600 | 41,100 | 26,700 | 42,400 |
| Female | 30,100 | 30,100 | 36,100 | 35,100 | 28,000 | 21,200 |
| Life Scientists | 33,100 | 33,200 | 29,300 | 35,700 | 40,600 | 29,700 |
| Male | 35,400 | 35,400 | 33,300 | 40,500 | 46,500 | 35,200 |
| Female | 25,200 | 25,100 | 21,600 | 28,400 | 32,500 | 18,700 |
| Psychologists | 33,400 | 33,900 | 26,800 | 22,500 | 41,200 | 25,400 |
| Male | 36,500 | 36,600 | 27,400 | 39,600 | 41,900 | 26,400 |
| Female | 29,000 | 29,700 | 26,600 | 19,300 | 37,400 | 24,000 |
| Social Scientists | 31,800 | 32,200 | 22,800 | 38,700 | 34,300 | 25,600 |
| Male | 34,700 | 35,100 | 23,800 | 41,900 | 39,100 | 28,500 |
| Female | 25,000 | 25,200 | 21,400 | 31,700 | 21,500 | 18,700 |
| Engineers, Total | 40,800 | 41,000 | 35,700 | 40,500 | 41,300 | 38,000 |
| Male | 41,100 | 41,200 | 35,900 | 40,800 | 41,500 | 38,300 |
| Female | 34,300 | 34,300 | 32,900 | 35,000 | 34,700 | 33,900 |

Source: National Science Foundation. Women and minorities in science and engineering: an update. Washington, DC, 1992.

**Table 4. Doctoral Scientists and Engineers in Academic Institutions by Field, Rank and Sex, 1989**

| Fields | Total Faculty* | Professor | | Associate Professor | | Assistant Professor | | Instructor/ Lecturer | | Adjunct Faculty | | Other Faculty | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Total Fields | 220,942 | 90,205 | 41 | 50,550 | 23 | 38,687 | 18 | 4,435 | 2.0 | 3,920 | 1.8 | 17,996 | 8.1 |
| Men | 181,078 | 82,857 | 46 | 40,873 | 23 | 27,371 | 15 | 2,704 | 1.5 | 2,607 | 1.4 | 12,895 | 7.1 |
| Women | 39,864 | 7,348 | 18 | 9,677 | 24 | 11,316 | 28 | 1,731 | 4.3 | 1,313 | 3.3 | 5,101 | 12.8 |
| All Scientists | 195,981 | 78,877 | 40 | 45,372 | 23 | 34,701 | 18 | 4,094 | 2.1 | 3,388 | 1.7 | 16,735 | 8.5 |
| Men | 156,796 | 71,619 | 46 | 35,828 | 23 | 23,675 | 15 | 2,384 | 1.5 | 2,085 | 1.3 | 11,707 | 7.5 |
| Women | 39,185 | 7,258 | 19 | 9,544 | 24 | 11,026 | 28 | 1,710 | 4.4 | 1,303 | 3.3 | 5,028 | 12.8 |
| Chemists | 15,074 | 7,143 | 47 | 2,521 | 17 | 1,930 | 13 | 292 | 1.9 | 80 | 0.5 | 1,709 | 11.3 |
| Men | 13,213 | 6,700 | 51 | 2,201 | 17 | 1,591 | 12 | 147 | 1.1 | 25 | 0.2 | 1,354 | 10.2 |
| Women | 1,861 | 443 | 24 | 320 | 17 | 339 | 18 | 145 | 7.8 | 55 | 3.0 | 355 | 19.1 |
| Physicists/Astron | 13,825 | 5,906 | 43 | 1,781 | 13 | 1,346 | 10 | 257 | 1.9 | 184 | 1.3 | 1,644 | 11.9 |
| Men | 13,185 | 5,797 | 44 | 1,680 | 13 | 1,183 | 9 | 230 | 1.7 | 175 | 1.3 | 1,557 | 11.8 |
| Women | 640 | 109 | 17 | 101 | 16 | 163 | 25 | 27 | 4.2 | 9 | 1.4 | 87 | 13.6 |
| Mathematicians | 11,614 | 6,019 | 52 | 2,667 | 23 | 2,169 | 19 | 294 | 2.5 | 69 | 0.6 | 217 | 1.9 |
| Men | 10,498 | 5,709 | 54 | 2,324 | 22 | 1,811 | 17 | 253 | 2.4 | 57 | 0.5 | 194 | 1.8 |
| Women | 1,116 | 310 | 28 | 343 | 31 | 358 | 32 | 41 | 3.7 | 12 | 1.1 | 23 | 2.1 |
| Statisticians | 1,974 | 803 | 41 | 600 | 30 | 344 | 17 | 30 | 1.5 | 70 | 3.5 | 16 | 0.8 |
| Men | 1,765 | 770 | 44 | 523 | 30 | 258 | 15 | 23 | 1.3 | 70 | 4.0 | 16 | 0.9 |
| Women | 209 | 33 | 16 | 77 | 37 | 86 | 41 | 7 | 3.3 | | | | |
| Computer/Info Spec | 6,349 | 1,606 | 25 | 1,884 | 30 | 1,726 | 27 | 42 | 0.7 | 91 | 1.4 | 380 | 6.0 |
| Men | 5,660 | 1,521 | 27 | 1,719 | 30 | 1,493 | 26 | 42 | 0.7 | 84 | 1.5 | 353 | 6.2 |
| Women | 689 | 85 | 12 | 165 | 24 | 233 | 34 | 0 | 0.0 | 7 | 1.0 | 27 | 3.9 |
| Earth Scientists | 5,519 | 2,348 | 43 | 1,160 | 21 | 915 | 17 | 65 | 1.2 | 119 | 2.2 | 449 | 8.1 |
| Men | 4,985 | 2,291 | 46 | 1,054 | 21 | 711 | 14 | 46 | 0.9 | 104 | 2.1 | 353 | 7.1 |
| Women | 534 | 57 | 11 | 106 | 20 | 204 | 38 | 19 | 3.6 | 15 | 2.8 | 96 | 18.0 |
| Oceanographers | 1,354 | 544 | 40 | 269 | 20 | 154 | 11 | 2 | 0.1 | 36 | 2.7 | 236 | 17.4 |
| Men | 1,193 | 515 | 43 | 250 | 21 | 101 | 8 | | | 32 | 2.7 | 189 | 15.8 |
| Women | 161 | 29 | 18 | 19 | 12 | 53 | 33 | 2 | 1.2 | 4 | 2.5 | 47 | 29.2 |
| Atmospheric Sci | 952 | 268 | 28 | 196 | 21 | 171 | 18 | | | 35 | 3.7 | 151 | 15.9 |
| Men | 893 | 254 | 28 | 182 | 20 | 169 | 19 | | | 33 | 3.7 | 138 | 15.5 |
| Women | 59 | 14 | 24 | 14 | 24 | 2 | 3 | | | 2 | 3.4 | 13 | 22.0 |
| Biological Sci | 43,198 | 15,561 | 36 | 9,005 | 21 | 7,074 | 16 | 933 | 2.2 | 813 | 1.9 | 6,145 | 14.2 |
| Men | 32,934 | 14,016 | 43 | 6,951 | 21 | 4,705 | 14 | 458 | 1.4 | 427 | 1.3 | 3,982 | 12.1 |
| Women | 10,264 | 1,545 | 15 | 2,054 | 20 | 2,369 | 23 | 475 | 4.6 | 386 | 3.8 | 2,163 | 21.1 |

**Table 4. Doctoral Scientists and Engineers in Academic Institutions by Field, Rank and Sex, 1989 (continued)**

| Fields | Total Faculty* | Professor | | Associate Professor | | Assistant Professor | | Instructor/ Lecturer | | Adjunct Faculty | | Other Faculty | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Agricultural Sci | 8,714 | 4,135 | 47 | 1,996 | 23 | 1,536 | 18 | 46 | 0.5 | 63 | 0.7 | 760 | 8.7 |
| Men | 8,080 | 4,075 | 50 | 1,838 | 23 | 1,309 | 16 | 42 | 0.5 | 60 | 0.7 | 593 | 7.3 |
| Women | 634 | 60 | 9 | 158 | 25 | 227 | 36 | 4 | 0.6 | 3 | 0.5 | 167 | 26.3 |
| Medical Scientists | 16,774 | 5,181 | 31 | 3,993 | 24 | 4,162 | 25 | 506 | 3.0 | 414 | 2.5 | 1,531 | 9.1 |
| Men | 11,188 | 4,196 | 38 | 2,572 | 23 | 2,179 | 19 | 315 | 2.8 | 284 | 2.5 | 1,016 | 9.1 |
| Women | 5,586 | 985 | 18 | 1,421 | 25 | 1,983 | 35 | 191 | 3.4 | 130 | 2.3 | 515 | 9.2 |
| Psychologists | 22,930 | 8,958 | 39 | 5,689 | 25 | 4,431 | 19 | 588 | 2.6 | 555 | 2.4 | 1,684 | 7.3 |
| Men | 15,267 | 7,416 | 49 | 3,966 | 26 | 2,343 | 15 | 185 | 1.2 | 164 | 1.1 | 815 | 5.3 |
| Women | 7,663 | 1,542 | 20 | 1,723 | 22 | 2,088 | 27 | 403 | 5.3 | 391 | 5.1 | 869 | 11.3 |
| Economists | 12,372 | 6,106 | 49 | 3,220 | 26 | 2,209 | 18 | 214 | 1.7 | 195 | 1.6 | 351 | 2.8 |
| Men | 10,940 | 5,802 | 53 | 2,764 | 25 | 1,734 | 16 | 140 | 1.3 | 142 | 1.3 | 292 | 2.7 |
| Women | 1,432 | 304 | 21 | 456 | 32 | 475 | 33 | 74 | 5.2 | 53 | 3.7 | 59 | 4.1 |
| Sociologists/Anthro. | 10,488 | 4,232 | 40 | 3,449 | 33 | 1,709 | 16 | 261 | 2.5 | 230 | 2.2 | 371 | 3.5 |
| Men | 7,292 | 3,376 | 46 | 2,452 | 34 | 946 | 13 | 87 | 1.2 | 127 | 1.7 | 141 | 1.9 |
| Women | 3,196 | 856 | 27 | 997 | 31 | 763 | 24 | 174 | 5.4 | 103 | 3.2 | 230 | 7.2 |
| Other Social Sci | 24,844 | 10,067 | 41 | 6,942 | 28 | 4,825 | 19 | 564 | 2.3 | 434 | 1.7 | 1,091 | 4.4 |
| Men | 19,703 | 9,181 | 47 | 5,352 | 27 | 3,142 | 16 | 416 | 2.1 | 301 | 1.5 | 714 | 3.6 |
| Women | 5,141 | 886 | 17 | 1,590 | 31 | 1,683 | 33 | 148 | 2.9 | 133 | 2.6 | 377 | 7.3 |
| Engineers | 24,961 | 11,328 | 45 | 5,178 | 21 | 3,986 | 16 | 341 | 1.4 | 532 | 2.1 | 1,261 | 5.1 |
| Men | 24,282 | 11,238 | 46 | 5,045 | 21 | 3,696 | 15 | 320 | 1.3 | 522 | 2.1 | 1,188 | 4.9 |
| Women | 679 | 90 | 13 | 133 | 20 | 290 | 43 | 21 | 3.1 | 10 | 1.5 | 73 | 10.8 |

* Includes "Does not Apply" and "No Report". Blanks indicate no cases reported.
Source: Professional Women and Minorities • Commission on Professionals in Science and Technology, 1992.

employed biological and life scientists, respectively.[3] In the general population, African Americans and Hispanics account for 11 percent and 8 percent, respectively, of the Nation's workforce.

In professions such as medicine, for example, the percentages of minority graduates are far below the percentages of these populations found in the work force. These disparities are amplified in minority female graduates who are represented among minorities by roughly the same percentages as women in the general populations.[3] African-American women are the only exception to this trend. They comprise 56.2 percent of African-American graduates, but the proportion of all African-American graduates is only 6 percent of the Nation's total.[3]

Identifying discriminatory behavior and institutional practices in the workplace is an important step in breaking or breaking through the glass ceiling, and progress has occurred in this area. But there is far more to the success of women in the sciences than the removal of overt discrimination. The prevailing culture must change its approach to the education and training of women, particularly in the sciences.

Established female scientists such as Shirley M. Tilghman see only one means for bringing cultural change: "There is only one solution and that is the recruitment of more women into science. Numbers really matter. When women reach a critical mass in a field, the cultural barriers naturally begin to slip away."[4]

In building a "critical mass," a large range of issues must be addressed, from the treatment of women in the mass media to the availability of mentors, role models, and advocates. The working-group reports, which are detailed in the pages that follow, provide specific steps to be taken at each level of education and training. Eleven working groups formulated

recommendations on fundamental issues in education, professional education, re-entry and workplace climate, and retention. An additional slate of eight working groups met to develop recommendations in specific areas such as networking, ethnic issues, and building support structures.

Above all, it is hoped that these workshop recommendations will serve as a call to break with the past. Over the years, we were taught to limit ourselves through stereotypes, and we learned the lesson all too well. Today, more than ever, women have the opportunity to learn the right lessons and truly test our potential.

Just as important, we have the opportunity to pass on these lessons to others. As cochairs of this workshop, we hope that the recommendations presented here will help foster the development of future generations of women scientists and biomedical professionals.

**Reference**

**1.** National Science Foundation (NFS). Women and minorities in science and engineering: an update. Washington, DC: NSF, 1992.

**2.** American Association of University Women (AAUW) Education Foundation and National Education Association. The AAUW report: how schools shortchange girls. Washington, DC: American Association of University Women Educational Foundation, 1992.

**3.** Professional Women and Minorities. Washington, DC: Commission on professionals in science and technology, 1992.

**4.** Tilghman SM. Science vs. women—a radical solution. New York Times. 26 January 1993: Sec. A, p. 23.

# Prenatal Through Eighth Grade

*Cochairs:*

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## Introduction

From birth to eighth grade, the attitudes of the family and community about what science is, who does it, and what value it has largely govern how science is taught and how girls perceive their relevance to science. To involve girls and women from diverse cultures and communities in science, it is essential that they appreciate the need for scientific inquiry and find science knowledge, skills, and values to be accessible. Also, it is vital that they see themselves as being worthy and able to master such skills and knowledge. These perceptions need to be held by students, their families, teachers, school administrators, and the community, including the scientific community. It is critical that the ability to ask, analyze, and answer scientific questions is encouraged and supported and that girls believe in their ability to address such questions.

Unfortunately, for a significant number of American youth, societal and environmental factors significantly diminish acquisition of knowledge that can greatly enhance their lives. Prenatal exposure to toxic substances, inadequate nutrition, poor health, overcrowded and unsafe schools, insufficient financial resources, and dysfunctional family life seriously impede children's biopsychosocial development and learning potential. Access to educational opportunities by girls and women is limited because of society's narrow definition of science and awareness of who engages in scientific careers.

The societal stigma against women in mathematics and science is perpetuated, in part, by inaccurate and limited media portrayals of women scientists as positive role models. The views of educators and family, particularly of parents, of what is appropriate scientific knowledge for girls can effectively dissuade or encourage them to participate in mathematics and science activities. Peer pressure and gender biases in children's toys also have an influence.

Many opportunities exist for the development of interest, motivation, and preparation for biomedical jobs and careers among young women. However, the way science is presented, taught, and isolated from other subjects in the curriculum can hamper this development. Science skills and knowledge are not always presented as contributing to the enhancement and enrichment of personal development, parenting, health, environment, and personal and public decision making. The value of science in preparing for rewarding and satisfying jobs and careers is neglected. Instead of presenting science as culturally centered and variable in taste and style, educators often portray science as objective and rigidly proscribed. This presentation of the scientific method conflicts with many cultures. Failure to link science with its related ways of knowing and doing mathematics and technology (including medical technologies) further circumscribes and limits relevance of the subject to biomedical careers for young women.

The science learning environment in preschool, elementary, and middle schools is usually not conducive to successful participation by children. Science is not considered to be a basic component of the curriculum in all schools nor do students have science classes every day. Textbooks, inadequate materials, inappropriate teacher education, excessive class size, insufficient teacher time, inadequate community support, and other systems mitigate against an active inquiry experience for each child. Teachers and administrators often do not take advantage of available opportunities such as the NIH Office of Education's network. Because students' natural curiosity is not nurtured, they tend not to use science as an opportunity to ask questions, look for information, and reach conclusions concerning their real world. Consequently, children's interest and sense of their ability to succeed in science are discouraged. Girls are discouraged

by the conflicts between social expectation and the active involvement required for success in science.

## Recommendations

The following recommendations for action are grouped under three priority areas: role of the communities, role of the schools, and role of the scientists. They can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, community institutions, foundations, private industry, Federal agencies, and the ORWH.

### *Role of Communities*

An attempt to encourage young girls to enter biomedical careers must include strategies that encompass the home and the local community as well as act as a catalyst for change at the national level. The action items recommended by the working group to implement these strategies are divided into four age periods: prenatal and infancy, preschool, elementary, and middle school.

Prenatal and Infancy

- *Parental Involvement*—Infant stimulation programs, especially for any at-risk children, at homes, hospitals, churches, and day care centers should be promoted by Federal and local governments.
- *Local Community*—Local women's substance abuse programs and residential recovery programs for women with children should be developed.
- *National Level*—Intergovernmental substance abuse programs should be promoted.

Preschool

- *Parental Involvement*—Informal programs that focus on science and personal health education should be encouraged and made accessible to all parents.
- *Local Community*—The Headstart Program should be expanded to reach more children; its science curriculum should be strengthened.
- *National Level*—Intergovernmental national and regional clearinghouses on science education resources should be developed.

Elementary

- *Parental Involvement*—Programs that facilitate parents obtaining general equivalency diploma certification and continuing education need to be expanded.
- *Local Community*—Programs that provide simple "tips for parents" on science-oriented activities that can be done at home should be established.
- *National Level*—Linkages with organizations that offer informal after school and summer science education programs need to be established. These hands-on activities allow girls to explore science through programs that encourage risk taking and problem solving in a nonjudgmental manner, thereby helping girls acquire confidence and continue their studies in mathematics and science. Important components of these programs are to expose girls to the variety of science careers available and to raise their expectations and aspirations.

Middle School

- *Parental Involvement*—Employee programs that provide *paid* leave for parental involvement in local schools can be sponsored by industries and businesses. Parents should recognize the importance of fathers in reinforcing their daughters acceptance of the compatibility of science and femininity.
- *Local Communities*—Donations of personal computers and software for use at local community centers should be encouraged. Designated times for the use of this equipment should be set aside for girls.

- *National*—Science-oriented television cartoons to be aired during children's prime viewing hours could be developed.

***Role of Schools***

The effective teaching and learning of science in elementary and middle school starts with effective teacher and student preparation. The following recommendations are ways to accomplish this.

- Teacher education programs emphasizing the empowerment of girls in science education, including risk taking, leadership, enhanced self-esteem, and the thrill of inquiry and discovery, should be implemented by colleges and universities.
- Science education for teachers, both preservice and in-service, should be improved.
- The improvement of preschool, elementary, and middle school science curricula should be promoted by the Federal Government. Some areas that could be addressed include advocacy for innovative and adequate learning materials, more effective student-teacher ratios, and access to and interaction with local laboratory facilities.
- Grants by NIH and other funding sources should be tailored to:
  - Provide service payback loans to support students who teach and do research in underserved areas. Biomedical, behavioral, and educational research is needed to improve women's health and science education.
  - Support externships developed and supervised to encourage hands-on endeavors in the scientific workplace. Middle school students could work as laboratory helpers in various capacities and receive monetary compensation for their efforts. These externships could stand alone or be a part of research grants.
  - Enhance programmatic commitments by applicants to foster improved teaching and learning of science, including improved undergraduate science teaching for science preprofessionals as well as preschool through middle school science teachers.
- Interdisciplinary science undergraduate courses to provide an appropriate professional background for elementary and middle school science teachers should be refined by colleges and universities.
- The incorporation of contemporary health, environment, and parenting issues into elementary schools' science curricula, thus providing a link between science and the students' immediate environments should be encouraged.
- To enhance and facilitate the highest quality of science learning from *all* students regardless of ability, appropriate learning outcomes should be developed and disseminated to preschools, elementary, and middle schools.
- School counselors should encourage girls to continue to take science and mathematics courses.
- Because national standardized tests are insensitive both to local environments and to the interdisciplinary aspects of biomedical fields, appropriate assessment tools should be developed.
- The development of health curricula that emphasize understanding, depth of knowledge, and the interdisciplinary nature of science should be encouraged.

***Role of Scientists***

Given that science is a field wherein individual "discoveries" are actually the end result of generations of learning and effort, scientists are uniquely qualified and driven to support educational programs. Scientists can present children, teachers, parents, and the community with exciting activities that promote understanding. Specifically, scientists are in a position to have a major influence on young girls' perceptions of science and mathematics. Women scientists provide excellent role models for the next generation. To increase scientists' opportunities to contribute to the education process, it is recommended that:

- A clearinghouse be developed to provide scientists, parent organizations, community groups, and schools with information on sci-

ence education programs, including lists of NIH-supported scientists who are willing to volunteer to work with children, teachers, and parent groups; relevant university and corporate programs; and resources such as the American Chemical Society's *Wonder Science* comic books.

- Science education projects that are relevant to this age group be funded. Some examples of these projects include the development of science project packets that teachers and parents can use; programs that integrate students and individual scientists; stimulating software programs; science fairs; and "invention days" at which students display their inventions.
- An instructional science video that shows female scientists at work be produced.
- When evaluating grant applications, importance of scientists' community service projects should be recognized. Examples of projects include participation in judging local science fairs and efforts to educate and train students, teachers, and parents.
- Professional societies be encouraged to become involved in the community and to *specifically* recruit women and minorities.
- Outreach programs developed by individual scientists with their local elementary school classes should be encouraged.

# Ninth Through Twelfth Grade

*Cochairs:*

*Donna Deyhle, Ph.D.*

*Ellen C. Weaver, Ph.D.*

## Introduction

By the year 2000, two out of three new entrants into the work force will be women and minorities. This work force will require strength in science, mathematics, and technology—subjects girls are still being told are not suitable for them. The *AAUW Report: How Schools Shortchange Girls*[1] and other studies underline the fact that girls and boys are not treated equally in our public schools.

Problems facing women in science, education, and employment often arise from deeply ingrained stereotypes, long-term educational processes, and strong sociocultural norms. Part of the solution lies in widespread and long-term changes in educational systems and attitudes and in the behavior of educators and parents, as well as in the public.

Reasons for focusing on ninth- to twelfth-grade girls include:

- According to the NAEP, gender differences in science achievement are largest for 17-year-olds, and these differences have not changed since 1978. The areas of largest male advantage are physics, chemistry, earth science, and space sciences.
- High schools girls, even those with exceptional academic preparation in mathematics and science, are choosing mathematics/science careers in disproportionately low numbers.
- Girls who do go on in scientific fields after high school report that the encouragement provided by their teachers is very important, but they also felt that counselors discouraged them.
- Girls do not participate in as many science activities as boys and develop an increasingly negative view of science, science classes, and science careers—an attitude that continues from ages 13 to 17.
- Girls experience a diminished mathematics confidence and achievement in the middle school years.

Studies indicate that intervention can make a difference. Providing students, especially girls, with more real-life experiences with science and scientists may make a big difference. In addition, changing the public images of subjects such as physics and chemistry to reflect the diversity of these fields and their relevance provides girls with the kind of "inside information" that daughters of scientists get.

Studies of effective biology teachers indicate some commonalities that may be emulated by other science teachers. For example, their classrooms are attractive, well-equipped, and well-maintained; they use laboratories more and lecture less. These teachers all have solid academic preparation for teaching and continue their formal education. Their instructional techniques encourage creativity, further education, and basic skills development; they encourage students to enjoy science outside the classroom through field trips, science projects, and science clubs. Especially important for girls, the teachers bring female scientists into classes, include a range of nonsexist career information, and present "girl-friendly" science that focuses on topics of interest to young girls.

In order to improve the science education of young girls from the ninth to the twelfth grades, five priority areas need particular attention:

- Adoption of summer and short-term science programs for girls.
- Teacher and counselor training.
- Role models.
- Textbooks and curricula.
- Strategies to change media perceptions.

Within in each of these areas, we list specific recommendations for action. They can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, community institutions, foundations, private industry, Federal agencies, and the ORWH.

***Recommendations***

Adoption of Summer and Short-Term Science Programs for Girls

- Residential and nonresidential summer programs for girls should be funded. These programs would:
  - — Emphasize not only substantive curriculum but also issues relating to role models, mentoring, and careers as basic components.
  - — Focus on "hands-on" science.
  - — Contain a student population that is culturally diverse with culturally sensitive curriculum and mentors representing varied races and ethnicity.
  - — Develop strong linkages among universities, corporations, and the school programs.
  - — Tap students with high motivation who may not necessarily be the most academically capable.
  - — Provide information about the educational system and requirements for B.S., M.S., and Ph.D. degrees.
  - — Provide information on how to take Standard Achievement Tests.
  - — Offer financial support through internships, scholarships, etc.
  - — Provide consistent followup with students after the program has ended (e.g., through a newsletter).
- Programs for extended days, after school, or weekends that are based on existing models could be funded. Examples include "Kids Teaching Kids" and outreach programs funded by the Howard Hughes Medical Institute or the University of Arizona. Programs sponsored by the Young Women's Christian Association (YWCA) or Girl Scouts or camps with a science component could also be funded.
- Research centers selected for grants should be required to include a precollege component in their grants.
- Model programs should be evaluated through longitudinal studies and should be funded for a minimum of 5 years.

The design of such programs should be based on research already available about learning styles of young women and should reflect an awareness of ethnic differences. Programs should also build in a component for parent involvement, such as participation in assignments relating to genetics in which they have to describe the family medical history. Program managers should recognize that girls may come from dysfunctional families and may require a range of support services to assist their emotional and academic development.

***Teacher and Counselor Training***

The educational efforts of high school teachers need to be augmented as they provide instruction in mathematics and science. Teachers need additional updated information on race and gender relations, new scientific discoveries, and instructional strategies.

- Teachers should be required to take preservice courses in colleges of education that focus on issues of race, ethnicity, class, and gender.
- Preservice teachers need science method courses that use alternative instructional strategies such as cooperative learning, hands-on experimentation, and peer teaching.
- Workshops or orientation sessions should be provided at the beginning of the academic year for parents and teachers on the full range of career options in mathematics and the sciences.
- Standards need to be set by principals and superintendents to ensure that science and mathematics teachers are certified, qualified, and experienced. In 1984, 30 percent of the science teachers were unqualified or underqualified. Districts need to ensure that their students are exposed to teachers who are trained specifically in the courses they are teaching. Master teachers in the sciences can be identified in each district to provide in-service assistance and serve as resources to other science teachers.

- Summer fellowships and internship programs should be provided to teachers to update their science knowledge. Cooperative efforts among universities, government, and private corporations should create work experiences to enhance the scientific knowledge base of teachers. These summer experiences in private and government laboratories and on college campuses can be used to develop new curricula for individual classroom teachers.
- Public and private sources need to be identified and used to enhance the resources available in science classrooms. Mobil vans with state-of-the-science equipment can facilitate exposure to these rich resources in poor and rural districts; public, private, and joint partnerships can be developed to support them.

Counselors influence student participation and achievement with their expectations, advice, and encouragement. They can provide female students with important encouragement, knowledge about course options, college entrance requirements, career opportunities, and financial support. Research has shown that encouragement for a career in the sciences from a teacher can be squashed with gender-biased discouragement from a counselor.

- Counselors should be required to take a course on race, class, ethnicity, and gender during their professional certification training.
- Counselors should be made aware of and linked to clearinghouse computer programs for science career options, summer student internship programs, and scholarship programs.
- Professional scientific organizations should be linked to information networks that counselors can access.

***Role Models***

Because women are in a minority in the sciences, both in and out of the classroom, high school students have few, if any, role models of women scientists.

Role models are a crucially important element in encouraging an adolescent girl to believe she is "good enough" or "smart enough" to pursue a career in science. If girls seldom or never encounter female scientists, however, it may discourage many from ever aspiring to be scientists themselves.

Role models must be similar enough to the female student for her to be able to think "I could be like her" or "I could do that." This can be an especially strong motivator if the female doctor, health professional, or researcher is of similar ethnic origin to the student.

Several suggestions have emerged on how to provide high school girls with role models.

- Exposure to female scientists should be provided to girl students before adolescence.
- Adopt-a-School programs that can expose girls to women working in scientific professions should be instituted and encouraged.
- Books and videos on biomedical careers, highlighting ethnicity, gender, and cultural sensitivity, should be developed.
- A clearinghouse for mentors should be established and publicized nationwide by interested organizations, such as the Association for Women in Science.
- Older female students should be encouraged to mentor younger ones.
- Financial and other support should be given to girls to attend conferences of scientists so that they can be exposed to the excitement and ferment of current science. Some associations, such as the American Association of Plant Physiologists, that have a Teaching Booth and Teaching Experiments hold conferences that are suitable for science fairs and attended by scientists particularly interested in teaching.
- Summer camps should develop and encourage science programs taught by female scientists.
- Short-term or summer research projects that are held in laboratories should be developed by Federal agencies and private industry for high school students.

***Textbooks and Curricula***

In recent years, textbooks and curricula have made some improvement in portraying scientists as not exclusively male or exclusively white. However, the contributions of female scientists are rarely presented in any significant detail. According to the AAUW[1] report, "Researchers at a 1990 conference reported that even texts designed to fit within the current California guidelines on gender and race equality for textbook adoption showed

subtle language bias, . . . and absence of women from accounts of technological developments." Similarly, Marsha Matyas points out that "textbooks and other classroom materials are often targeted toward boys, using examples and role models that would be most appealing to the white male students."[2]

- Efforts to monitor and improve textbook quality should be supported, especially those in the life sciences and health-related fields. This includes developing mechanisms for ensuring that texts are accurate; include relevant and current issues; and are sensitive to cultural, ethnic, and gender issues. Supplemental material on women's contribution to the sciences needs to be included to augment current textbooks.
- Curricula should include a variety of teaching strategies that work well with learning styles favored by many girls such as "hands-on" activities, teamwork, field trips, computer-based analyses, and problem-centered case studies.

***Media***

Media—particularly television—are powerful molders of attitudes, both positive and negative. High school girls are especially vulnerable to depictions of society's expectations of appropriate roles for girls and young women as shown through the media. Many shy away from "unusual" occupations in the fear that they will seem less feminine, less attractive, or more competitive with the males.

The media often perpetuate and reinforce the image of scientists as men. Even otherwise admirable science programs, such as "National Geographic," "Nova," and Jacques Cousteau specials, are almost invariably narrated by a man and feature men in prominent roles, whereas women appear in supportive roles and are often unidentified.

Women scientists need to:

- Be media sensitive and media active. Professional organizations should have media relations departments and should prepare a file of female experts identified as authority figures. Staff should develop ongoing liaisons with the press to ensure more positive reception of press releases and story ideas involving female experts.
- Clarify roles and goals of female scientists. Review what women see as roles and goals through TV, radio, papers, and magazines and identify the diverse professional roles in the biomedical/mathematics/physical sciences. One type of project would be to create or identify videos, for example, write a script for science roles and give it to the media departments of high schools and ask them to cast and produce it from within their community; it could be a medical mystery or a "What's My Line?"
- Contact all media—local newspapers, TV, radio—with stories about women in the local community who have science jobs.

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## Undergraduate Through Doctoral

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### Introduction

Barriers to attracting and retaining women in science at the undergraduate and graduate levels are many and pervasive in the academic environment. For example, inadequate preparation in mathematics during elementary school can prevent a woman from choosing science as a career. Likewise, bleak job prospects even after attaining a Ph.D. may steer women away from science.

Barriers that occur during a student's undergraduate and graduate years fall into institutional, financial, cultural, and social categories. At the institutional level, the lack of female role models and mentors in the sciences and in positions high on the academic ladder can discourage female students. Financially, women are less likely to take risks with their education according to some authors and would, therefore, be more sensitive than men to the lack of financial support or resources for child care. Culturally, women may be dissuaded by their ethnic group or even by parents who believe that women are not suited for a career in science. In graduate programs, the social isolation of attaining an advanced degree in nontraditional disciplines and the perceived or real difficulty of combining school with a career and family may work together to dissuade a woman from pursuing a career as an independent scientist. Furthermore, conflicts with thesis advisors can disillusion women students as well as men. At both the undergraduate and graduate levels, sexual harassment, in both its overt and covert forms, continues to be a problem. In spite of these obstacles, some women persist in choosing a career in science. The recommendations below are aimed at easing the barriers for women and drawing women into science.[1,2,3] They can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

### Recommendations

#### *Increase the Opportunities and Resources for Students in the Sciences*

*Action Plan for Undergraduates*

- Laboratory research opportunities, either during the school year or the summer, for which students receive a stipend should be developed. This exposure would show students that a scientist spends her day in the laboratory designing and conducting experiments and would erase some of the misconceptions undergraduates might have as a result of their experiences in science courses. Possible sources of funding include private companies and foundations, such as pharmaceutical companies, and governmental sources. An extramural program to attract and retain women undergraduate students by providing them with research opportunities should be established.

Described below are several examples of successful programs.

The Women in Science Project at Dartmouth College encourages women who enter college with fairly strong interests in science, including mathematics and engineering, to continue their interests and consider careers in science and engineering. This program reaches out to female students during the summer before their first year at Dartmouth. Students are invited to participate in an exciting and challenging program of science internships, seminars, mentoring, and visits to industry sites. Through the project, approximately 40 to 50 women are placed in scientific research internships immediately after their first term of study. Nearly one-fourth of the first-year women in each of the classes of 1994 and 1995 have participated in the Women in Science Project. In 1991, 118 first-year women participated; in 1992, 114 first-year women

participated. Approximately 45 first-year internships have been offered each term.

Upperclass and graduate students are welcome to attend all programs and project activities. Approximately 86 faculty and other researchers have offered to supervise first-year internships under the Women in Science Project.

The Women in Science Program at the University of Michigan was founded in 1980 to encourage and support women entering the nontraditional fields of science, engineering, and mathematics. Its offerings are extensive and include research internships, a program to encourage women to pursue graduate degrees, and a reentry program for women who are returning to science.

The Attracting Students to Science Program at the Howard Hughes Medical Institute could serve as a model for an extramural program sponsored by the ORWH. In the fall of 1987, the institute launched a grants program to help strengthen education in medicine, biology, and related sciences that complements the institute's research program. The grants support graduate, undergraduate, and precollege science education in the United States and biomedical research abroad. The institute provides research opportunities as part of its significant investment in undergraduate research. Nearly one-third of the institute's total funding for undergraduate science education is used to provide college students with a range of compelling experiences in research laboratories; additional funding will be directed to this end from future awards. The institutions receiving grants are free to develop their own undergraduate research programs either during the summer or academic year on campus with their own faculty members or off campus in industrial or other research laboratories. A major objective of this grants program has been to increase the participation of women and underrepresented minorities in science.

- Universities that give credit for laboratory experience or for similar work in a community setting such as a women's health clinic should be encouraged.

- A nationwide directory of programs to increase the participation of women undergraduates in science should be developed, published, and widely distributed.

*Action Plan for Graduate Students*

- Universities should be encouraged to create and maintain support groups for their female graduate students.

An ideal model for this, entitled "Women in Life Sciences," has been developed by three students at the University of California-San Francisco (UCSF). Women in Life Sciences is an organization run by graduate students. Its purpose is to create a local network of female scientists at UCSF and promote the recruitment, retention, and advancement of all female scientists. By holding specific events to target problems that plague many female graduate students, this group has directly affected the feelings of isolation and self-doubt that many women students experience. Often students think they are the only ones who feel inadequate or incapable of continuing in science. Women in Life Sciences has created an environment of support and encouragement so that female students can discuss, confront, and resolve specific problems related to their graduate school experience.

This organization sponsors guest speakers, panel discussions, and focus groups that concentrate on topics addressing science and gender. Topics have included sexual harassment, the glass ceiling, and balancing personal and professional responsibilities. The enthusiasm and success met by this organization indicates, in part, the extraordinary need for such organizations.

As an official registered campus organization, Women in Life Sciences has applied for and received funding from campus sources, specifically from the Associated Students of the University of California, the Graduate Students' Association, and the Chancellor's Endowment Fund. Funding sources such as Federal agencies or foundations should acknowledge and support groups such as Women in Life Sciences by encouraging their formation on other campuses. One way of doing this is to make funding available for female graduate students to form such groups. Institutions could then use these resources, as well as resources from national professional organizations, to develop successful support groups for their female graduate students.

- As part of their course work, graduate students should be required to enroll in a "professional socialization seminar." In this seminar, students would be taught

how to prepare a paper for publication, how to design their own research plan, how to cope with harassment in the workplace, and how to combine science with family goals. Such a seminar is offered by the sociology department at the University of California-Santa Cruz.

- A nationwide directory of female scientists who are willing to answer questions or serve as mentors should be developed. Data bases from which these names could be drawn currently exist, for example American Women in Science and the NSF.
- Opportunities for part-time graduate education should be provided. Part-time training could be provided through predoctoral training grants, such as the National Research Service Awards.
- Affordable, on-site child care that includes lengthened days should be provided for graduate students' children.

***Change the Academic Environment***

The following recommendations are aimed at enhancing the number of women who select science or mathematics as an undergraduate major or an area for graduate study.

*Action Plan for Changes in the Institutional Climate*

- A critical mass of female educators and scientists should be created by increasing the number of women in faculty positions in science and mathematics within institutions.
- The number of women in positions of power—for example, department chairpersons and deans—should be increased.
- The purpose and structure of first-year science and mathematics curricula should be changed so that courses are not primarily there as a filter or for "weeding out" students.
- Educational and research programs in science and mathematics that would attract young women to the institution should be highlighted in local and national media. This might include special interest stories about talented female scientists and their specific areas of interest.
- The careers of female faculty in science and mathematics should be highlighted during introductory or freshman courses.
- Seminars or panel discussions that highlight women in various scientific careers should be offered.
- Special on-campus weekends for the spouses, parents, and families of science majors should be arranged so that they develop an in-depth understanding of career opportunities at the B.S., M.S., and Ph.D. levels for their daughters or wives.
- Universities and colleges should develop ties to provide a greater variety of research opportunities for students, especially in areas that are lacking at their home institutions.
- Formalized mentoring programs for junior faculty should be developed; programs should include guidelines that faculty members could use for mentoring undergraduate or graduate students.
- Faculty handbooks or other guidelines for tenure and promotion should be revised to include appropriate rewards for innovative teaching, curriculum development, mentoring activities, or research in areas that include women's health.
- Appropriate methods for teacher evaluation that include input from students, alumnae, and peers should be developed.
- Special support programs for at-risk students should be offered. Such programs exist at Clark-Atlanta University where students, beginning in the summer before college enrollment and continuing through their undergraduate education, have increased exposure to science and mathematics experiences; and at Spelman College where selected female students are involved in an overall science family that encompasses family living, research programs, and science course work.
- Recruitment materials for undergraduate and graduate science and mathematics programs should be developed in a variety of formats, for example, brochures, catalogs, and videotapes and should include visuals of women and minorities.
- Campus clearinghouses for information about graduate programs, women in science who could potentially serve as mentors, and job opportunities that would be of help to women should be established.

- The availability of information on female researchers, financial opportunities for undergraduate and graduate students, and special research opportunities, for example, summer internships, should be increased.

*Action Plan for Faculty Development*

- Seminars, workshops, or conferences to help faculty improve teaching styles should be offered.
- Training on mentoring should be offered so that better faculty and protege interactions can be achieved.
- Educational sessions on how sexual harassment can be prevented or avoided should be offered.
- Faculty should be educated about the special needs of women so that they can be more supportive of women who have selected science or mathematics as a major.
- Faculty should be sensitized to the needs of certain subsets of women who because of ethnic diversity, differences in cultural background, or physical disabilities may have to overcome additional barriers to be successful in science or mathematics.
- The methods by which science is taught in the classroom setting should be changed to better meet the needs of women who may learn more easily when a variety of formats in addition to lectures are used (e.g., group learning or small discussion groups).
- Faculties should be educated to make science less abstract by building bridges among scientists, people, and the world.
- The mentoring skills of faculty should be enhanced so that they feel comfortable with students of both genders.
- Scientists submitting grant applications and renewals to granting agencies should be required to demonstrate that they encourage the participation of women in science. The awarding of a grant or its renewal could be contingent on meeting such criteria.

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# Undergraduate Through Health Professional Degrees

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## Introduction

Many barriers deter women from entering and remaining in the biomedical sciences during the period from undergraduate studies through the awarding of a professional degree. The barriers include nonsupportive milieus in families, communities, and schools. At universities, the institutional barriers have included the lack of women in positions of power, a lack of female role models and mentors, a lack of financial support for students, and a lack of commitment by the faculty and senior staff to the idea of women in the biomedical sciences.

## Recommendations

The working group identified and made recommendations in four priority areas. They can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

Increase the Number of Women in Positions of Power Clearly, one of the major ways to effect an overall advancement of women in biomedical careers is to increase the number of women in positions of power. The following recommendations address this point.

- The current pool of women available and eligible for appointments to positions of power in professional organizations, industry, institutions, and Government agencies should be identified through surveys. These surveys would provide information to create a data base for tracking the progression and advancement of female health professionals.
- A clearinghouse should be established to match available positions of power to the available pool of women.
- The pool of eligible women should be expanded by the provision of leadership training and funds to institutions for developing leadership training programs for women. Forums for networking by women would help identify and publicize available positions of power.
- Efforts to recruit women to positions of power should be paired with active lobbying by the institutional administration for the appointment of women.
- Institutions and universities should be encouraged to develop plans for proportionately distributing women in positions of power. Search committees should have 50 percent female representation.
- Funding for institutions should be linked to proof by the institutions that they have adequately represented women in power positions, for example, demonstrated increases in such appointments during the past funding cycle.
- Funding for institutions should be linked to availability of day-care centers and clearly defined parental leave policies that are incorporated into tenure policy.

***Increase the Number of Women Role Models and Mentors***

The need for female role models and mentors has been expressed repeatedly. There are a number of ways in which this key element in encouraging women to enter and stay in science careers can be advanced, including:

- Female role models should be promoted by making women more visible, by nominating women for prestigious awards, and by using the clearinghouse described above to identify women as role models and mentors.

- An annual research conference should be held to target women enrolled in graduate biomedical programs. The conference would provide them with an opportunity to present their research and to facilitate networking with established health professionals.
- Existing preprofessional programs should be identified and funding incentives to broaden career counseling in the health professions should be encouraged.
- Off-campus and evening study programs for women should be established to provide opportunities for nontraditional ways to pursue degrees aimed at entry, reentry, or advancement in the health professions.
- Externships for undergraduate female students to stimulate their interest in biomedical careers should be offered.
- Matching funds to stimulate outreach efforts should be provided; these efforts should include women participating in health-care settings. Health professionals should be encouraged to provide summer and part-time jobs for preprofessional college students.
- Professional societies should be encouraged to increase outreach efforts to local students and teachers and provide advisors for future professionals at their annual meetings.
- Professional societies and schools should be encouraged to make mentor training available to professionals.
- Federal agencies, private industry, and universities should be encouraged to increase the number of fellowships for college, graduate, and professional students. This could be facilitated by establishing tax incentives for funding sources. Fellowships could be publicized through an 800 telephone number. Professional schools should be encouraged to form partnerships in education with colleges and high schools.

***Increase Financial and Scheduling Support for Prospective Students***

The following recommendations address the need to decrease the financial and time barriers that exist for many prospective students, whether they are entering or reentering the academic setting.

- Reentry programs for women who have been out of the academic or work force settings should be developed and funded; these programs should be funded on a regional basis to account for demographic and cultural differences.
- Mechanisms to make interest on educational loans tax deductible should be developed.
- Industry should be encouraged to fund high school and college science programs and scholarships for women, for example, summer laboratory experiences.
- Flexible scheduling that allows women with families to remain in, or re-enter, the work force should be developed and expanded, particularly by private industry.
- Policies that provide flexible schedules for people in the work force who are pursuing higher education should be developed. A cooperative education program between learning institutions and industry should be expanded, for example, to allow for hands-on paid experience in a health position, including a transportation allowance as needed.
- Loan repayment programs for women entering health professions, especially in underserved areas or women's health, should be developed. For example, the Public Health Service Corps is a model that could be used for non-M.D. health professionals; the American Medical Women's Association (AMWA) also has an existing model of a student loan program.

- Mechanisms to make tuition for short-term laboratory experience for students reimbursable should be developed and encouraged. For example, R01 recipients could apply for reimbursement of salaries paid to hired students.
- Merit scholarships for women and minorities entering the health professions should be encouraged.
- Institutions should consider funding transportation and child care so that women can pursue health professional opportunities.

***Target Faculty and Senior Staff to Increase Their Commitment to Recruitment and Re-Entry of Women Into Biomedical Careers***

Support for the recruitment and reentry of women into biomedical careers must come from faculty and senior staff, as well as from junior staff. This can be accomplished through the following recommendations.

- Institutions should be encouraged to fund sabbaticals for junior faculty to enhance their scientific careers.
- Information data bases that could be used for advising students about funding and other health career opportunities should be developed and made available to faculty.
- On-site offices at universities, colleges, and professional organizations to specifically address women's issues should be established.
- At least one woman or a minority should be included on every short list for hiring.
- Professional organizations should put gender bias issues on their agenda.
- Sensitivity training about women and minorities should be required for faculty members.

# Women's Colleges: Their Role In Preparing Women Scientists

*Cochairs:*

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## Introduction

> *. . . fewer women than men declare science as a major in college, and a greater proportion of women abandon science as a major for other majors . . . .*
> *I note that there is an interesting exception to this trend: All women's colleges lose fewer of their science majors to other fields. Based on my personal experience, I believe that women's colleges can engender an environment and a mindset in which there are no barriers based on gender... an environment that encourages women to pursue "nontraditional" fields—like science and medicine.*[1]
>
> Bernadine Healy, M.D.
> Director
> National Institutes of Health
> 1991–1993

Because women's colleges are highly successful in producing female scientists, they can serve as leaders and resources for all institutions of higher learning. Women's colleges have always educated female scientists, employed them, and encouraged them at a time when social practices excluded them from such pursuits. Today, women's colleges educate female scientists, employ them, and encourage them at a time when, not social practices, but social prejudices still identify the sciences as male disciplines.

Studies have shown that women at women's colleges are one and one-half times more likely to earn baccalaureate degrees in the life sciences, physical sciences, and mathematics than women at coeducational institutions[2] (Table 1). In addition, the percentage of majors in mathematics and the life sciences is higher in women's colleges today than it is even for men at coeducational colleges[1] (Table 2). And only two institutions of *any* size in the country have more women graduates in physics than does Bryn Mawr, a woman's college in Pennsylvania. Women are 1½ times as likely to earn baccalaureate degrees in the life sciences, physical sciences, and mathematics at a women's college than at a coeducational institution.

**Table 1. Percentages of 1986 Graduates Earning Degrees in Selected Majors**

| Coed Schools | | Women's Colleges |
|---|---|---|
| 1.4 | Economics | 4.0 |
| 3.5 | Life Sciences | 5.4 |
| 1.5 | Mathematics | 2.3 |
| 1.2 | Physical Sciences | 1.7 |

Source: National Center for Educational Statistics, 1986.

Graduates of women's colleges continue toward doctoral degrees in mathematics, science, and engineering in disproportionately large numbers compared with women graduates of coeducational colleges. The Great Lakes College Association, based in Ann Arbor, Michigan, found that between 1970 and 1982, only 4.3 percent of women received their baccalaureate degrees from women's colleges, but these graduates constitute 7.2 percent of all women with doctorates in mathematics and physical sciences and 6.6 percent of those with doctorates in the life sciences. In 1986, Elizabeth Tidball, a physiologist at the George Washington University Medical Center in Washington, D.C., and the first researcher to comprehensively examine the conditions that produce high achievement by women, reported that graduates of women's colleges were two to three times more likely to go to medical school than were women at coeducational institutions.[3]

Three topics are central to a discussion of the role of women's colleges in preparing female scientists: science programs offered at women's colleges, the unique benefits to women of a single-sex learning environment, and dissemination of

**Table 2. Percentages of Students Enrolled in Selected Majors, by Year, at Women's and Coeducational Colleges**

| | Women in Women's Colleges | Women in Coed Colleges | Men in Coed Colleges |
|---|---|---|---|
| **1971** | | | |
| Life Sciences | 3.8% | 2.8% | 5.3% |
| Physical Sciences | 1.4% | 0.8% | 3.9% |
| Mathematics | 3.6% | 2.5% | 3.2% |
| **1986** | | | |
| Life Sciences | 5.4% | 3.6% | 4.1% |
| Physical Sciences | 1.7% | 1.2% | 3.2% |
| Mathematics | 2.3% | 1.5% | 1.8% |

Source: National Center for Education Statistics, U.S. Department of Education.

scientific thinking. While each of these areas involves established traditions, each also offers the possibility for innovation and the development of models that can be adapted in coeducational settings.

## Recommendations

***Science Programs Offered at Women's Colleges***
In addressing science programs at women's colleges, the working group focused on three types: precollege, undergraduate curricula, and extracurricular activities. *Precollege programs* address the need for science teacher training and seek to stimulate an interest in science among precollege girls and young women. The following are examples of precollege programs.

- The College of St. Elizabeth in New Jersey offers its faculty and laboratory resources to elementary school teachers (grades kindergarten through six) who wish to develop mathematics and science activities for their students.
- In its Howard Hughes Program, Spelman College, the historically African-American women's college in Atlanta, brings high school teachers and their students to the campus for biology lectures and laboratory sessions that are taught by college faculty. Students also participate in a 6-week summer program in biology taught by Spelman faculty. Interested students are encouraged to conduct research projects at Spelman with a faculty mentor.
- Spectacles, a mathematics and science camp for middle school girls, has been established by Georgia's Wesleyan College faculty members.
- The Expanding Your Horizons program, initiated in 1976 at Mills College in California, brings middle and high school girls, their parents, and their teachers to campus for a day-long workshop that combines a hands-on experience with informal presentations by female scientists. Expanding Your Horizons makes parents an integral part of the learning experience, thus underscoring for both parents and students the importance of mathematics and science. Since 1976, Expanding Your Horizons has been offered at 115 sites throughout the country, and more than 220,000 girls have benefited from the program.

*Undergraduate curricula* seek to prepare college women for graduate and professional science training. *Extracurricular activities* that support and enhance the science curriculum range from special events intended to generate interest in science to extensive residential experiences for groups of science students. Among the most interesting programs are the following.

- Spelman College, an institution that has received national recognition for its outstanding proportion of science graduates (more than 30 percent of all graduating seniors), offers a constellation of programs that demonstrates its commitment to undergraduate science training. In addition to its

intensive 6-week summer science courses for newly accepted students. Spelman has a comprehensive Women In Science and Engineering (WISE) Scholars program. Young people enter this program as first-year students and receive full tuition, fees, and a stipend. Each student is assigned a faculty mentor and works at the National Aeronautics and Space Administration site during the summer. Students meeting program requirements can remain in the program throughout their university career at Spelman.

- Simmons College in Boston addresses the needs of its diverse undergraduate population through two special opportunities: the Excel program offers supplementary preparation to underprepared first-year women while the honors program challenges highly motivated and advanced students through a series of rigorous courses.

Recognizing the importance of exposure to working laboratories, most women's colleges facilitate placement of their science students in internships, both on and off campus.

- Wellesley College in Massachusetts offers 10-week summer stipends for campus laboratory apprentices.
- Mount Saint Mary's College in Los Angeles targets minority women for off-campus biomedical research internships that will help them gain access to graduate programs or medical school. Minority women are a priority of the College's outreach to the local community in general. Underprepared high school seniors are identified for recruitment into a 2-year program from which successful graduates continue on to 4-year degree programs. The continuation from the 2-year to the 4-year program by these women is more than 70 percent. Virtually all graduate with a 4-year degree, many of them in the biological sciences.
- To highlight and promote the achievements of women in science, St. Mary's of Indiana celebrates Hypatia Day through demonstrations, lectures, and discussion groups; Hypatia was the first female scientist of record.

***The Unique Benefits to Women of a Single-Sex Learning Environment***

Beyond specific programs intended to foster women's science education, women's colleges provide a mindset and an environment most conducive to nurturing the progress of women in the sciences. The characteristics of this special environment should be identified because certain features may be transportable to coeducational settings. Among the most evident of these features is the substantial number of role models present in women's colleges.

In her study, Tidball found that more than one-half of the colleges most successful at keeping women in natural sciences to a doctorate degree are women's colleges, despite the fact that there are only 85 women's colleges in the United States. Tidball has established a statistically significant correlation supporting the direct relationship between the number of women faculty and the number of women students who achieve in the natural sciences.[2] The greater the number of adult women of accomplishment present in the environment, the more likely are female students to have significant accomplishments after graduation.[3] Female science faculty can serve a central role as mentors for emerging female scientists. The positive impact of mentoring on young women pursuing science, mathematics, and engineering careers is confirmed in a study by Eccles and Jacobs.[4] They found that women from women's colleges pursuing careers in nontraditional fields were more likely to report having had a woman as a role model, to enter graduate school, and to demonstrate a greater commitment to a career than their coeducated sisters.

Women's colleges offer a "critical mass" of female students and scientists, according to Eccles and Jacobs, thereby creating an environment that counters the sense of isolation that afflicts young women elsewhere. Female scientists at coeducational universities find themselves part of a minority in a traditionally male discipline, in a traditionally male institution.

Women's colleges use one-on-one mentoring in a supportive atmosphere, and they maintain high expectations of their students—a fundamental building block of personal empowerment,

especially in the sciences. As Etta Falconer, director of science programs at Spelman College, is reported to have said when asked the secret to Spelman's success, "We expect them to succeed and they do."

Just as mentoring involves special dedication, networking opportunities for science students at women's colleges are taken seriously among students, faculty, and alumnae who recognize the importance of establishing and maintaining links between established and emerging scientists.

Project Kaleidoscope, a comprehensive study of the teaching of mathematics and science at the undergraduate level, paid special attention to what the most successful programs did and how these successful strategies could be copied. After examining a variety of institutions—notably women's colleges and historically Black colleges where some of the most dramatic, positive results were found—the investigators recommended that undergraduate science and mathematics training be done in communities where learners and scientists work close to each other. Networking and mentoring, central to these learning communities, are especially valued at women's colleges.

A fine example of this desirable natural science community of learners can be found at Douglass College. This women's college, located at Rutgers, The State University of New Jersey in New Brunswick, established the Douglass Project in 1986 to support women who had chosen technical fields of study. A residential community was designed for 100 women from Douglass College and from the Rutgers School of Engineering, complete with living space for graduate-student advisors and counselors as well as on-site computers and recreation facilities. The project organizes lecture series devoted to academic, professional, and social topics that are important to this group of women. Douglass graduates virtually every young woman who chooses a technical field.

***Dissemination of Scientific Thinking***

In addition to preparing women for scientific careers, women's colleges can be a powerful force for promulgating general science literacy among women. Given the increasing reliance on a technological infrastructure, it is imperative that individuals in all sectors of society have a basic command of scientific principles and the scientific method. For example, to participate in and contribute to dialogues on issues such as fetal transplants, euthanasia, and artificial intelligence, women need a working understanding of the scientific foundations of these compelling social questions. Furthermore, a basic grounding in scientific thought for the undergraduate community serves to legitimize the aspirations of those women pursuing scientific careers.

## Recommendations

The recommendations offered in this section can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

***Principal Recommendations***

The special features of the women's college environment should be systematically studied and documented. These recommendations are designed to export to coeducational campuses those aspects of women's colleges that are conducive to the nurturing of female scientists. If implemented, these recommendations have the potential for creating a more female-oriented campus climate. This information should be widely disseminated for use in coeducational settings. The work group recommended that the following actions be implemented:

- A large-scale study, coordinated by the WCC, should be sponsored to document strategies and programs at women's colleges that succeed in producing scientists.
- A document, summarizing study findings, should be disseminated to academic deans at all academic institutions. This document should be prepared and disseminated in conjunction with organizations such as the AAS, the NSF, and the Association of American Colleges (AAC).
- A panel of consultants from women's colleges should be established to assist coeducational institutions in adapting and implementing female-centered programs.

The funding for research opportunities for both faculty and students at women's colleges should be enhanced. The funding of faculty research benefits both faculty and students. It enables faculty to continue their professional development, keeping them current and allowing them to maintain their status among their peers at research institutions. Moreover, faculty research affords their undergraduates an opportunity to experience science in action. Faculty members actively engaged in research are more effective mentors because they are better able to advise and place their students in graduate and professional programs.

- Preference should be given to large institutions that subcontract pieces of their research to researchers at women's colleges.
- Research grants earmarked for teachers and their undergraduate students in all scientific disciplines at women's colleges should be established.
- Funding, including matching grants for up-to-date instrumentation, should be instituted.
- Aspects of Academic Research Enhancement Awards grants should be changed by NIH by:
  - — Increasing the potential amount of each grant.
  - — Making grants renewable and long term.
  - — Changing the application deadline to August or September to allow teaching faculty to use summer months to prepare applications.

Assist the efforts of women's colleges to target precollege (kindergarten through twelfth grade) girls interested in science by supporting college-sponsored programs that enrich girls' scientific experience, nurture their nascent interest, and enhance scientific initiation for all students through supplementary teacher training. These programs have the dual benefit of cultivating science careers and at the same time promoting general science literacy. Whether 1 day or 1 year in length, such programs make available to the educational community the substantial resources of a women's college, most especially, a faculty committed to encouraging the scientific accomplishment of young women. Attempts to engage young women in scientific pursuits at the college level may come too late; therefore, women's colleges can provide a tremendous service by targeting precollege women. By making science more "real" through hands-on experiences and interactions with working female scientists, girls and young women are more apt to consider exploring these disciplines further.

- Faculty-led, day-long workshops or longer seminars, with significant laboratory work, should be conducted for the benefit of science teachers-in-training and working precollege teachers of science. These workshops should emphasize effective strategies for engaging girls and young women in the sciences as well as offering material that would make the teaching of science more dynamic and more experimentally based.
- Affiliations between precollege teachers and college faculty should be established so that informal consultation is possible throughout the year. The college's science faculty would become mentors to and a resource base for precollege science teachers.
- Summer programs on women's college campuses that expose girls and young women to science and aspects of science careers should be established.
- Science career days to provide girls and young women with hands-on science experiences and discussions with female scientists should be held.
- New models for teacher training that focus on science teaching skills and encourage the integration of science into the whole curriculum at the primary and secondary levels should be developed. Just as reading and writing are skills that are assumed to apply to all aspects of the educational experience, so the scientific perspective should become incorporated into the entire curriculum. The skills necessary to implement this transformation should be taught to novice and experienced teachers. Women's colleges could become leaders in developing these models.
- A program of public service announcements that advocates scientific literacy and educational reorientation toward science should be developed. Public service announcements

can also be used to draw attention to the untapped scientific human resources that girls represent, in the manner of the United Negro College Fund.

*Additional Recommendations*

- A program should be established for the purpose of providing a mechanism for professional support and the exchange of information on research, teaching, and the position of women in the sciences. This program would:
  - — Increase the visibility of women in the sciences, by establishing a registry of women scientists by discipline.
  - — Sponsor regional undergraduate scientific conferences for women.
- Women's colleges should develop and implement a systematic plan for optimal mentoring of emerging women scientists. While mentoring has always been valued at women's colleges, the practice of mentoring has largely been left to the discretion of individual faculty members. A systematic plan for the training, support, and recognition of mentors would institutionalize an important educational strategy that has heretofore been implemented somewhat randomly.
- Women's colleges should establish associations with local corporations engaged in scientific activity to develop internship opportunities for students and collaborative ventures.
- Training grants for graduates of women's colleges who plan to pursue graduate studies in scientific disciplines should be created. These training grants would provide a much-needed bridge between students' educational experiences and their careers as active professionals. It is striking that, even after years of undergraduate education, students have relatively little knowledge of the profession they will be pursuing. Training grants to women's colleges would allow these women to gain an understanding of the realities of professional scientific work.
- Matching funds earmarked for faculty who wish to travel to professional conferences should be made available to women's colleges. Because limited funds restrict travel to conferences by faculty at women's colleges, these grants would enable faculty members to participate in current dialogs in their disciplines.
- Closer relationships between faculty at women's colleges and those at other institutions should be established. This would facilitate the exchange of faculty, for example, as guest lectures and for sabbaticals, and their ideas.
- The establishment of a clearinghouse for the sharing of syllabi for science courses designed for nonmajors, including interdisciplinary endeavors should be funded. Such a clearinghouse could come under the joint sponsorship of organizations such as the AAAS, the NAS, and appropriate Federal agencies.

In conclusion, overhauling programs in such a way that more women are encouraged to enter and pursue the sciences would have a double benefit. As Project Kaleidoscope underscores, "The effective education practices that work best for women and minorities are identified as those that are the most effective for all students." Hence, if the strategies used at women's colleges could be adapted to other environments where mathematics, science, and engineering are taught, women as well as men in these disciplines would benefit and graduate in greater numbers to take up the challenges of the next century.

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# Reentry and Nontraditional Pathways to Success

*Cochairs:*

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## Introduction

Findings from a number of studies show that the proportion of women graduating at the bachelor's and master's levels in the health and life sciences is substantially higher than at the Ph.D. level, suggesting that a cohort of women exists who have initiated, but not continued, biomedical science careers. While it is critical that more women be encouraged to obtain doctoral degrees and contribute at higher levels to the body of biomedical research, those with bachelor's and master's degrees also make key contributions to research. Locating some of these women and providing incentives for their return to science would not only recapture the initial investment in their education but also would help to provide a critical mass of qualified personnel for the future.

Gaps in the career and educational continuity of women in science may arise as a result of several factors, especially:

- The lack of role models and mentors to guide and assist women in attaining their academic and career goals.
- Contradictory time and productivity demands of science, for example, "publish or perish" and "quantity versus quality" pressures, often dominate the scientific arena and preclude other aspects of life such as family. As a result of such demands, women are often forced to choose, at least temporarily, between career and other priorities. They may be forced to avoid a structured scientific career path to make and fulfill commitments to family and dependents. This is not to suggest that female scientists are incapable of meeting the demands of a scientific profession but only that other demands may redirect their energies. Indeed, in women as in men, there appears to be a growing desire for a life that is characterized by a more equitable balance between work and personal responsibilities.

Because women have left their educational and career pursuits is not, therefore, an absolute indicator that they lack interest in a career in biomedical science. To the contrary, many women would be eager to reenter a biomedical career or to follow one in a nontraditional way. Unfortunately, there are numerous barriers to reentering the work force and to following a nontraditional career path.

Obstacles that inhibit a woman's career pursuit in science tend to fall into three broad categories: cultural attitudes that science is not an appropriate career for women, particularly if they have taken time out from careers or are following nontraditional pathways; the self-perception that one is not capable of overcoming obstacles; and institutionalized limitations in access to educational, training, and career development opportunities.

The working group developed recommendations to address the following six priorities.

1. Increase the opportunities for career counseling to assist women in assessing skills relevant to biomedical careers and to develop strategies for successfully pursuing those goals, and develop mentor programs to help women become knowledgeable about the social and political structure and function of the biomedical community.
2. Develop policies and programs to remedy the disadvantages faced by women who have taken years out of their career paths. These include a lack of a continuous publication record, a lack of recognition of the skills and accomplishments that they have already developed and exhibited in nontraditional pathways, a difficulty in breaking into established scientific circles, and a lack of clearly defined programs to update knowledge of a field and learn new techniques.

3. Sensitize persons in authority about negative attitudes and expectations often projected when women enter or reenter a biomedical career, for example, doubts about the appropriateness of science as a career for women, requirements of a level of performance greater than those expected of people who have "proven" their dedication by following a traditional path, and the perception that these women who have temporarily left the field lack a commitment to their profession.

4. Reverse the morale problems resulting from those pervasive negative attitudes about women who have chosen nontraditional career paths: lack of self-confidence, low self-esteem, social isolation in the biomedical community, concern that they must be "superwomen" to succeed, and concern that they are perceived as too old.

5. Develop worksite policies to accommodate career women with family responsibilities, including the care of dependents. These policies should include the wider availability and use of part-time and flex-time positions and other flexible employment opportunities.

6. Increase funding, programs, and positions available to women reentering biomedical careers.

## Recommendations

The recommendations that follow can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

***Model Programs***

- A model laboratory to demonstrate the workability of part-time and/or flex-time positions and to document the productivity of nontraditional work schedules should be established.

- Comprehensive programs to integrate women on nontraditional career paths into scientific research programs should be developed by a funding institution. These programs should include support systems and incentives for mentors and should institutionalize departmental culture change to acknowledge the value of nontraditional students. Institutional linkages among two-year schools, four-year colleges, research institutions, and industries should be encouraged.

- Possible partnerships with the Human Resource Development Program in the Directorate for Education and Human Resources of the NSF should be explored.

***Evaluation***

- A longitudinal assessment of developmental paths and career success of women in nontraditional and reentry modes should be conducted. Include exit interviews with women leaving research to determine their reasons for departure. Simplify institutional databases to allow for followup of researchers who are coinvestigators, thereby including not only principal investigators but also the entire research team.

- Criteria for evaluating institutions on their support for reentering women and those who have followed nontraditional career paths should be identified. These criteria should be used to monitor progress in addressing institutionalized limitations on access to educational, training, and career development opportunities. Institutions with a good record should be recognized and rewarded. These criteria should also be used to set minimum requirements for accreditation.

***Information Gathering and Sharing***

- A clearinghouse should be established at an appropriate organization for information on programs related to reentry and nontraditional career paths. Information should be provided through a toll-free 800 telephone number and an electronic bulletin board such as Women in Science and Engineering—WISENET (Appendix 5). The information and format of the database should be coordinated with similar databases to facilitate wider accessibility and usage.

- Female faculty should urge universities to conduct outreach and career counseling for women in their communities; they should contact university alumnae to locate potential reentry scientists.
- A pamphlet about women who have reentered biomedical careers should be published.
- One-page position papers on reentry issues should be developed and widely disseminated, especially through magazines and the popular media.

*Development of Personal Support Systems*

- Seminars for reentry women should be provided; active mentoring programs should be developed and institutionalized.
- Networking at many levels should be institutionalized—externally for recruitment of reentry women, hierarchically within institutions, and laterally among women in biomedical careers.
- Low-cost cooperative or congregate housing should be provided for reentry women with special needs (children, counseling, equipment).

*Regulation*

- All research grant applications should document an institution's rules and procedures for faculty promotion and tenure; evidence of promotion of women at the institution should be required.
- Research institutions commonly restrict nontenure-track staff from applying for research grants. Since many women in the sciences are underemployed, many capable investigators are prevented from applying for research funding as principal investigators. These policies should be reexamined and revised to more equitably include women.

*Mechanisms for Funding Individuals to Advance Their Research Careers*

- Fellowships that could include dependent care, a monthly stipend, specific laboratory or clinical retraining, and dissertation research support should be offered by universities and funding sources.
- A variety of career development awards should be developed and funded.
  - — Awards for junior-level women such as research associates and technicians who need training to become investigators; components should include course work, research training, and attendance and presentations at scientific meetings.
  - — Supplemental awards designed to facilitate initiation of independent research careers; components should include a feasible research project, a mentor, release time to complete the project, and no age stipulation in eligibility criteria.
  - — Awards for women who have reentered or followed a nontraditional path to acknowledge excellence in science.
  - — Awards to develop mentors by empowering mature women who must be at least 45 years old to provide positive role models based on broad experience.
  - — Awards to individuals whose career goals are in the area of teaching, journalism, policy development, or components of science other than laboratory research.
- Supplements to research grants, RO1s, PO1s, etc., and Request for Applications to provide research training to individuals reentering the academic community should be created. Training grant applications should be open to supplemental slots, which should provide components for updates on new courses, new training, and scientific problem solving.
- Funding should be competitive and open both to the private and public sectors, that is, grants may be awarded to persons located outside of traditional academic institutions.

# Internal Factors That Affect Women—Family Issues, Pay Equity

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## Introduction

In making recommendations, the working group's goal was to influence leaders in the workplace to institute and implement policies leading to a gender-neutral environment so that women and men are offered the same opportunities. Integral to this goal are two factors: the support of leaders who are responsive to women's issues, including the desire of women to achieve a balance between their professional and personal lives; and the appreciation of the distinct issues relating to minorities and the physically challenged.

Current barriers to accomplishing this goal include: conscious and unconscious discrimination by top management, for example, department chairs and deans; the lack of explicit, published, gender-neutral policies, opportunities, and pay scales; and the persistent dominance in the workplace of an archaic model for what is standard or desirable, specifically, the career-focused male wage earner with a house spouse available for all family responsibilities. When this model gives way to the egalitarian, two-professionals family of the 1990s, society can expect maternity and family leave, flexible tenure paths, and dependent-care plans and policies to become standard. The result will be a healthier society and a workplace environment that respect the needs of all professionals, regardless of gender.

The working group identified three major objectives to achieve the above goal:

- Provide explicit, realistic, widely publicized policies and opportunities.
- Develop effective leadership and innovative strategies for implementing gender-neutral policies and programs within the biomedical community, retraining or replacing incumbents if necessary.
- Develop mechanisms of accountability that evaluate the efficacy of the leadership and implementation strategies.

The following sections present recommendations for these three objectives. They can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

## Recommendations

***Explicit, Realistic Policies and Opportunities***
Explicit and published rules, guidelines, and policies provide a more level playing field, as does wide publicity about opportunities. Such dissemination of information enables women and other minorities to know the system and to be responsibly assertive, constructive, and focused in their expectations, ambitions, and efforts. The working group made the following recommendations.

- Employers in the academic, public, and private sector should provide, disseminate, and publish policies that develop and sustain an environment free of gender inequities and that address the following areas:
  - — Parental leave and dependent care.
  - — Salary equity.
  - — Harassment and grievance.
  - — Recruitment, retention, and promotion.
  - — Annual career evaluation.
  - — Tenure.
  - — Career orientation and development.
  - — Flexibility and flex-time, that is, shared residencies and practice positions with benefits included.

- The following opportunities and infrastructure components are pertinent to the advancement of an equitable, productive workplace and should be provided:
  - — Support groups, including an office that identifies available parenting resources within the community, such as the Harvard Medical Center's Office for Parenting.
  - — A computer-based directory of female researchers and research projects relevant to women's health and available from the National Library of Medicine.
  - — On-site day care with hours to accommodate schedules of biomedical professionals and with sick care services.
  - — Faculty development programs.
  - — Funding plans for predictable contingencies such as family illness, disabilities, and pregnancy to ensure a smooth transition of clinical, academic, and research responsibilities.
  - — Formal mentoring networks.
  - — Interim research funding mechanisms.
  - — Uniformly enforced distribution of clinical, research, and teaching responsibilities.
  - — Creation of a resource list citing relevant publications and model programs, for example, Yale's Office for Women in Medicine.
  - — Mechanisms for lateral developmental moves with no salary penalty.
- Flexible programs for training and tenure tracks for entry-level professionals should be established so that women are not uniquely disadvantaged by taking time out for childbearing and child rearing.
- Pay scales that mandate equal pay for equal work should be published to make it easy to track gender differentials in pay. Published policies and explicit rules about assignment of teaching, clinical, and research duties also make it relatively easy to assess changes in patterns.

***Effective Leadership and Innovative Policy Implementation Strategies***

There are a number of strategies available to foster effective, nondiscriminatory leadership within the workplace environment.

- Mechanisms should be developed to make it costly not to treat women equitably. For example, resources could be linked to performance for the advancement of women and patterns of gender discrimination and sexual harassment could be considered as absolute bars to professional advancement or retention in a leadership position.
- Leadership training for gender and cultural awareness should be provided within such groups as professional organizations and specialty groups; councils of deans; principal investigators, division chairs, and office directors at Federal agencies; and private industry.

Individuals in positions of administrative authority, whose behavior sets the climate and patterns for the workplace, warrant special attention. For example, NIH, as the major source of funds for the biomedical research community, has a special responsibility to ensure that proof of nondiscrimination is indeed a criterion for grants. For example:

- Community-wide conferences should be sponsored to address issues relevant to the advancement of women in biomedical careers.
- Leadership among women should be cultivated by defining leadership parameters and by providing opportunities for women to develop leadership skills and experience.

Other strategies to promote gender-neutral policies should be pursued within the biomedical academic community. These might include:

- Commissions on the status of women at biomedical and academic institutions that have the ability and authority to track faculty progress by gender, pay equity, and like issues, and include community leaders on their boards.
- Faculty development seminars.

- Internal audits through the dean's office and through other higher administrative offices, for example, faculty senates.
- The use of community leaders to develop policies and mandates.
- The use of techniques of "Smart Marketing" to make constructive recommendations.
- The development of 5-year career plans that are reviewed annually.

Implicit in these recommendations is the need for an affirmative action approach to recruit more women as tenured full professors, chairs, deans, and directors. Women should be encouraged to form and participate in support groups and networks and to develop realistic career plans and expectations. Their own personal strategies for growth and professional acceptance and success should include being responsible and knowing the system, being assertive and seeking positions, and being constructive and focused.

***Mechanisms of Accountability***

All the strategies mentioned above are useful only if they are implemented and produce desired results. Outcome data and followup are needed. Accountability mechanisms must be developed to assess the effectiveness, impact, and suitability of various strategies and policies. One such auditing tool is called Women and Diversity Audit (WANDA). Accountability mechanisms must ensure that policies that do not meet criteria in WANDA are identified and not approved until corrected. Accountability also requires input from a widespread constituency to ensure that policies and programs meet the working group's stated goal of an equitable workplace environment that respects and dignifies the female professional.

# External Factors That Affect Women—Public Images, Stereotypes

*Cochairs:*

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## Introduction

For the purposes of discussion, the working group defined biomedical research careers to include not only bench research and clinical research but also such areas as health services; ethics; epidemiology; and psychosocial, economic, and primary-care research. Many women are attracted to positions that involve care-giving research that may not be considered as valuable as other forms of basic research; research in this area is valuable, and faculty who work in it should not be penalized or denied advancement.

This paper focuses on external factors that influence the workplace climate and, consequently, women's progress in biomedical careers. It makes recommendations in two major areas: (1) recruitment, retention, reentry, and advancement of women in biomedical careers; and (2) the image of women in biomedical science as portrayed in the media. For the first major area, several external, societal factors influence recruitment, retention, reentry, and advancement. Women are often expected and expect to maintain responsibility for home and children as well as for professional demands. Furthermore, society has defined success in research in terms of behaviors that are traditionally "male." For example, a man's aggressive behavior is accepted as the norm while the same behavior in a woman may be considered inappropriate or unacceptable. An ambitious man is considered to value his career; an ambitious woman is often described as having her priorities wrong. In our culture, the leader is a white man and women are not easily accepted as leaders. These gender biases are reflected in underrepresentation of women as department chairs, deans, tenured professors, and members and chairs of grant application review committees.

## Recommendations

The recommendations that follow can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

***Recruitment, Retention, Reentry, and Advancement of Women in Biomedical Careers***

A number of avenues are open to institutions to promote the entry and promotion of women in science careers. They include:

- Parental leave policies as well as leave policies for dependent care for elderly, children, or sick family members should be developed.
- The tenure clock should be stopped while a faculty member is on parental or dependent-care leave to stop punishing those attending to family responsibilities.
- Child-care services that are good, affordable, and convenient should be made available to faculty.
- Flexible schedules and partial payment for child care and sick-child care should be included in faculty benefit packages.
- Part-time and shared positions should be offered; research does not have to occur in the 9 a.m. to 5 p.m. schedule every day.
- Assistance should be offered to the accompanying spouse in a two-career family in obtaining suitable employment.
- The number of female reviewers in research grant application study sections and female deans and department chairs should be increased.

- To enhance the leadership role of female biomedical scientists, the exchange program that places female scientists from Federal agencies at universities for fixed time periods, usually from 1 to 2 years, should be expanded. This will increase trainees' contact with possible mentors or role models and improve intellectual exchange among scientists. In addition, such exchange programs will encourage female scientists to spend time at Federal agencies such as NIH and to socialize in such environments that enrich their own professional careers.
- To facilitate the advancement of female scientists, regional workshops on the "how-to's" of advancement in biomedical careers should be sponsored. Topics should include negotiations for salary levels, startup money, promotions, and tenure.
- Universities should be encouraged to develop incentives to promote female biomedical faculty.
- Special funding for a number of enrichment activities should be provided, including:
  - — Travel of female junior faculty, students, and trainees to scientific meetings to increase networking and scientific exchange.
  - — Science research experiences for girls in elementary, middle, and high school.
  - — Loan forgiveness for doctoral scientists, including physicians conducting biomedical research.
- Several, approximately 3 to 12, regional Centers for Women's Health Research should be considered. Funding for such centers should cover construction or renovation of space for offices, laboratories, and meeting rooms and for a faculty director and research scientists. Faculty appointments would be on tenure track, with joint appointments in the Women's Health Center and in appropriate basic and clinical science departments. Funding should be on a competitive basis and should be applied for by the sponsoring institution. Such centers should be an integral part of local university programs.
- Faculty retention plans should be included in affirmative action plans in order to increase recruitment and retention of female scientists.
- Reentry programs should be designed for women who still have family responsibilities and for "older" women. These programs should provide full salary support and necessary support staff, for example, laboratory technicians, and secretarial support. Included would be research training by faculty mentors; theoretical, didactic, and clinical experience; and assistance with job placement.
- Studies of countries with high proportions of women in biomedical careers and leadership positions should be conducted to determine enabling factors and incentives for recruitment, retention, and advancement.

***Image of Female Scientists in the Media***

To effect a major change in media portrayals is a massive task, probably beyond the scope of any single organization. The working group proposes the following recommendations designed to influence the media, to present an approach to public education to counter myths and stereotypes about professional women, and to present positive and interesting pictures of women in biomedical careers.

- Information about the extent of the media image problem should be compiled; public policymakers and the media should be informed of the findings.
- Leaders of research institutions should meet with editorial boards of major newspapers and television producers to discuss the extent of the problem and encourage the positive depiction of women in biomedical science.
- The use of female scientists as spokespersons and resources should be increased, and will require the following:
  - — Training in media and communication skills for female scientists by universities and professional organizations.
  - — Training in leadership and management skills by professional organizations and universities.
  - — Development and maintenance of a database by professional or other organizations that lists female scientists who can serve as resources and consultants to the media, including television, radio, and print vehicles.

- A strategy for preparing and publishing reports or articles for the public about women's health topics and contributions of female scientists should be developed for print media such as the *New York Times' Science Times* section, popular magazines such as the *Ladies Home Journal*, and literature for children and youth.
- Radio and television programs on discoveries in science, featuring realistic and appealing presentations of women scientists should be developed.
  - — Use current information about scientists who are making new and appealing scientific discoveries in areas deemed to be of public importance, including women's health.
  - — Present historical information about famous female scientists, for example, Madame Curie, and emphasize the excitement and personal and societal rewards of careers in science.
  - — NIH should organize and fund a distinguished scientist public lecture series given by female scientists to increase the public and professional visibility of female scientists.
- The scientific community and related organizations should endorse, as a priority, efforts to support the recruitment and retention of women in the biomedical sciences and should focus public relations efforts on increasing the visibility of female scientists and negating myths and stereotypes about women in the sciences. Each organization should:
  - — Compile a list of female scientists, their areas of expertise, and specific demographic characteristics, for example, minority status.
  - — Encourage networking activities among female scientists.
  - — Support the appointment of women in leadership roles within professional organizations and provide names of candidates to universities and the Federal Government.
  - — Ensure that career materials prepared for the public to attract students appropriately emphasize gender and cultural diversity.
- Professional organizations should develop a "media watch" in which examples of stereotyping, stigmatizing, and other inappropriate portrayals of biomedical scientists should be recognized and countered.
- Professional organizations should cultivate science writers, encouraging them to publish articles of public interest on biomedical advances and related public policy issues. Special emphasis should be placed on the contributions of female scientists, and attention should be paid to women's health issues.
- Workshops for science writers to disseminate information about advances in research and clinical care should be sponsored.
- Research on the impact of media portrayal and advertising on the recruitment of young women into biomedical careers should be funded.
- To address the negative image conveyed by advertising in medical journals, a tracking system should be developed to identify offensive or inappropriate advertisements and to enlist the support of professional societies, journal editorial boards, and industry. Feedback should be provided and actions recommended should there be the need for improvement. In addition, awards may be given to professional organizations for exemplary advertisements.

# Tenure and Promotion

*Cochairs:*

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## Introduction

In most U.S. universities, and particularly in medical schools, women are concentrated at lower faculty ranks and overrepresented in clinical educator positions that are usually nontenure track.[1,2] Only about 10 percent of full professors in academic medical schools are women. Few women are in positions of leadership in universities or medical colleges.[2] Conventional promotion and tenure processes in most colleges and universities are outdated, inflexible, and inappropriate for women now seeking careers in academic biomedicine. Academic institutions need to question the present-day definition and purpose of tenure: Is it an important concept for academic biomedical departments in the 21st century?

The gender gap in medicine's leadership is the result of many dynamic, interrelated features of the medical education and advancement systems and of differences between women and men. For example, no pauses are built into the education continuum or tenure or competence-proving timetables that would allow time for parenting or other family responsibilities without penalizing a person professionally. In medicine, pressures are especially acute because of the length of training and the around-the-clock demands of patient care. To become established as a clinical investigator, and this is an important route to leadership positions in academic medicine, 3 or more years of funded research training beyond residency are desirable in addition to 2 or 3 years of full institutional support before obtaining independent extramural funding. To maintain such a career, at least one-third of one's time should be committed to research. In the face of clinical, teaching, and administrative assignments, this one-third can be very difficult to protect, especially now when competition for patients and research funds is unprecedented. Even the most highly regarded senior researchers are experiencing cutbacks in their funding and are spending more time than ever writing proposals that go unfunded. Many junior researchers, but especially women without strong mentors or with family responsibilities, may see no choice but to give up.

Research is still the "gold standard" for most promotion and tenure decisions in biomedical academic departments; yet, in the 1990s, research funding is more difficult to obtain. Furthermore, research programs take progressively longer to become established and require significant levels of funding. It is no longer realistic to expect junior faculty to accumulate the research credits traditionally required to qualify for tenure or promotion in the conventional 6-year timeframe.

The socialization process also contributes greatly to the leadership gap; our culture has imposed passivity on women about their careers. For instance, in looking at the trait of "achievement orientation," investigators have found that women sometimes avoid channeling their need for achievement into power-related activities because power is inconsistent with the feminine stereotype. That women more than men are socialized to seek meaning primarily in relationships and in the achievements of those they nurture possibly helps to explain the disproportionate representation of female physicians on nontenured clinician-educator tracks. Combine this tendency with the tendency of male leaders to assume that women cannot handle the work of running the laboratory in addition to their other responsibilities, and the result is few women on the highest powered tracks.

These factors—the structural inflexibilities, the traditional "male" career trajectory as the standard, the lack of strong mentors, the cultural and perceptual bias against women devoting a lot of energy to their careers—have a cumulative effect. One common outcome is

isolation, leaving each woman to struggle in a vacuum to make sense of promotion requirements and to patch together arrangements for maternity leave and child care. In addition to exhaustion, isolation can lead women to underestimate the importance of organizational culture, politics, and budgets.

Change in tenure policies is difficult to accomplish. Medical schools cannot revise tenure policies unilaterally, and any attempts to alter university-wide tenure policies are likely to encounter strong opposition. Promotion policies vary among institutions; therefore, it is difficult to make specific recommendations for policy changes.

## Recommendations

The recommendations that follow can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH. First, however, as a general recommendation, we suggest that the ORWH send a summary of the priorities and strategies produced at this workshop to the boards of trustees of major universities and corporations. The aim in doing this would be to encourage partnerships between industry and academia to achieve some of the reforms described below.

***Increase the Research Opportunities for Women in Biomedical Science***

Increasing research opportunities for women should effectively increase the opportunities for promotion of women because research is still the primary factor for achieving tenure and promotion. Therefore, the working group recommends that:

- Funds for research conducted by women be earmarked by funding sources.
- Loan forgiveness programs for researchers in women's health should be established, (e.g., the Berry Plan.)[3]

It is recommended that Federal agencies, foundations, and other funding sources:

- Develop study sections to review and emphasize proposals for clinical research on women's health issues and other issues of interest to many women researchers.
- Insist that as part of Equal Employment Opportunity (EEO) requirements, institutions demonstrate appropriate representation of women at all academic levels to receive research funding.
- Set up mechanisms to accept and encourage research proposals in areas more relevant to women's research interests, such as disease prevention or interdisciplinary studies.
- Monitor salary equity for women through evaluation of salary requests for principal investigators, coinvestigators, and support staff.
- Remove time limitations on research grants—such as NIH's First Independent Research Support and Transition Awards (FIRST), which is a grant for a 5-year period—to allow women and others who have taken time off to remain eligible indefinitely.

The working group recommends that medical schools, colleges, universities, and academic professional societies:

- Emphasize the importance of women's health issues with more curriculum and research emphasis.
- Develop new sources of funding for research conducted by women such as endowments and corporate gifts.
- Develop corporate interest in funding women's health research.
- Ensure that female researchers become aware of national data sets and other resources, which are available from Federal agencies such as the CDC's National Center for Health Statistics (NCHS) that can be used to obtain valuable pilot data.

*Evaluate and Improve Faculty Structures and the Assessment Process*

To ensure that more women attain leadership roles in universities and medical schools, these academic institutions should promote more women to high academic ranks. The traditional promotion and tenure process is in direct conflict with the careers of many women. For many women the probationary, or pretenure period, comes at a time when they are having children after the arduous graduate and postdoctoral training periods. More flexibility in this and all phases of the promotion process is mandatory for women to reach upper academic levels and assume positions of academic leadership.

The working group recommends that medical schools, colleges, and universities:

- Separate tenure from promotion and compensation, which would enable qualified faculty to advance despite a shortage of tenured positions, and it would add much-needed flexibility to the "up or out after 7 years" status quo.
- Increase the flexibility of time requirements for promotion and tenure, for example, longer probationary periods and "clock stopping."
- Examine their own promotion records of female faculty members and of their faculty structures to see what improvements they can introduce to ensure equity and to increase flexibility.
- Evaluate department chairs on their performance in hiring and promoting women.
- Improve the quality and quantity of information provided to new faculty about expectations and available resources related to their academic development.
- Give more weight to research quality, as well as to teaching, clinical contributions, and mentoring, and deemphasize the quantity of publications in making promotion decisions.
- Appoint more women to promotion committees, that is, more than one woman per committee!
- Give more credit for work on collaborative research efforts such as large clinical trials.
- Take a leadership role in implementing family leave policies.
- Expand the availability of part-time faculty appointments without loss of tenure opportunities.
- Provide full benefits, including sabbatical eligibility, to faculty on nontenure tracks.

*Provide Mentoring and Career Development*

In addition to changing the academic promotion and tenure process, women must be made aware of the importance of promoting themselves and other women. The need for female role models in leadership positions in biomedical sciences is overwhelming and opportunities cannot wait but must be made available immediately.

The working group recommends that Federal agencies:

- Set an example to other research institutions by immediately implementing a program to identify and promote qualified women.

The working group also recommends that:

- Seminars on assertiveness training and management development for female biomedical scientists be organized and a resource list of sources for such training be developed.
- A resource directory of professional societies that have leadership development programs for women be established and maintained.
- An awards program aimed at colleges and universities for excellence in the recruitment and promotion of women in the biomedical sciences be developed.
- Existing faculty "survival guides" be reviewed and a national version of such a guide be published.

The working group recommends that the AAMC's Council on Academic Societies:

- Encourage its members to create leadership development training programs for women in their disciplines. At the same time, female faculty members should organize and, with the deans' support, create professional development programs to assist them in remedying deficiencies related to climbing the academic ladder.

The working group recommends that women in medical schools and biomedical science departments:

- Organize institutionally, for example, through "visibility committees." One of the functions of these committees should be to provide names of qualified female faculty members to search committees to ensure that women are nominated for senior vacancies.

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# Harassment in the Workplace

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## Introduction

According to the Equal Employment Opportunity Commission (EEOC), "Unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitute sexual harassment when: (1) submission to such conduct is made either explicitly or implicitly a term or condition of an individual's training or professional position, (2) submission to or rejection of such conduct is used as the basis for professional decisions affecting such individual, or (3) such conduct has the purpose or effect of unreasonably interfering with an individual's work performance or creating an intimidating, hostile, or offensive working environment."[1]

Women in biomedical careers have not escaped the added burdens and barriers created by sexual harassment in the workplace. A significant number of women report encountering sexual harassment from their professors and other persons in positions of authority, from their peers, and from their patients. Whether deliberate or inadvertent, many male scientists, physicians, students, and others frequently engage in gender-related conduct that is both unwelcome and damaging to the women with whom they work.

The successful elimination of sexual harassment depends on the *prevention* of inappropriate actions, coupled with appropriate *intervention* when these actions do occur. The dual priorities of prevention and intervention must be addressed in tandem; unidirectional focus will leave critical issues unaddressed. This report presents recommendations to increase the recruitment, retention, reentry, and advancement of women into biomedicine by preventing and reducing the sexual harassment faced in such careers. They can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

## Recommendations

***Develop and Implement Preventive Strategies***

A critical task in the elimination of sexual harassment is raising the level of awareness among the public of the definition of sexual harassment. Sexual harassment must be viewed in its broadest sense. It includes a continuum of actions ranging from gender harassment to seductive behavior to sexual bribery, sexual coercion, and assault. It occurs at all ages and in all settings—universities, medical schools, hospitals, and research facilities. Men, as well as women, may be victims. Status offers no protection; students, residents, independent researchers, and faculty may all be victims. Furthermore, in some cases, sexual harassment may be combined with racial or ethnic discrimination or discrimination based on disability.

The diversity of the United States presents a challenge for developers of preventive strategies. Social and cultural attitudes and mores play important roles in the perception, recognition, and denial of harassment in different settings. In addition, the diversity of cultural experiences often results in unrecognized microinequities committed by well-meaning individuals. Preventive strategies should be culturally relevant and begin at a young age when patterns of behavior are formed. Consequently, the effective development of preventive measures depends on creative strategies that are relevant to persons of various ages, cultures, and life experiences. Regardless of gender, individuals must be educated and sensitized about sexual harassment issues and motivated to help eliminate the problem.

The working group underscores its appreciation for the efforts of the director of the NIH, Dr. Bernadine Healy,* in her personal commitment to achieve respect, dignity, and harmony in the workplace at the NIH. This commitment, exemplified by her request for a survey of harassment among female scientists at NIH, underscores the importance of these issues. The workgroup also commends NIH and ORWH for their strong commitment to combat sexual harassment. The working group submits the following recommendations as further preventive strategies.

- Research on the effect of harassment on the health of individuals involved, at all stages of the life cycle, should be funded.
- Pilot programs designed to prevent and correct sexual harassment at all stages of the life cycle should be funded and instituted.
- Studies to investigate the prevalence of sexual harassment and its effect on the recruitment, retention, reentry, and advancement of female physicians and scientists in biomedical careers should be supported.
- A resource directory providing information on the topic of sexual harassment and available resources (consultants, written materials, videotapes, etc.) for combating it should be developed and distributed widely.
- All biomedical institutions should incorporate education on sexual harassment into orientation programs for new students and employees and offer similar training to all employees on a continuing basis at regular intervals. Training should include the identification of harassment; its detrimental effects, prevalence, and root causes; and informal and formal institutional mechanisms for addressing harassment.
- All biomedical institutions should consider training for female students and employees designed to empower them to recognize, discourage, and when necessary, document and report incidents of harassment.
- All biomedical institutions should consider training for students and employees to discuss gender-related attitudes and behavior in educational and professional settings.

***Develop and Implement Intervention Strategies***

Policies and procedures that address sexual harassment in the workplace exist. Title VII of the Civil Rights Act of 1964 specifically prohibits sexual harassment of employees. Title IX of the Education Amendments Act of 1972 extended this coverage to employers and students. Additional legislation has been passed by many states, and institutions across the country have instituted a range of policies. Sexual harassment is illegal.

Nonetheless, sexual harassment continues. A study by the University of Wisconsin School of Medicine revealed that 33 percent of women surveyed reported sexual harassment from a colleague,[2] and other studies report similar findings. Although undesirable and illegal for more than 25 years, sexual harassment continues to occur with frequency throughout one of the most highly educated communities in our Nation—the community of biomedical science.

Rates of sexual harassment reporting are much lower than might be expected. In the University of Wisconsin School of Medicine study, for example, only 2 percent of the women reporting harassment filed a sexual harassment claim.[2] A number of factors may contribute to this. Not all institutions have policies and procedures on sexual harassment, and, even when present, harassment policies are not always enforced. Women may be discouraged from reporting harassment because of fears of retaliation. Retaliatory actions may be difficult to identify and yet have significant impact on promotion, tenure, and other career decisions.

Clearly, preventive strategies alone are not enough. Interventions designed to correct ongoing harassment and to mitigate harms of past harassment are also necessary. The bolstering of current mechanisms and the development of new systems to deal with sexual harassment are critically important. Effective intervention strategies will educate students and employees about sexual harassment, offer appropriate protection to both the accuser and the accused, and include sanctions that will effectively eliminate inappropriate behaviors. Effective intervention systems may also serve an important deterrent function. Creativity in developing informal and formal remedies may benefit the victim while

*Dr. Healy served as NIH director from April 1991 to June 1993.

effectively eliminating the behavior of the harasser. The working group recommends the following strategies for intervention.

- A model sexual harassment policy should be developed by funding institutions to serve as an example for grantee institutions. This model should establish sexual harassment policies and complaint procedures that meet all legal requirements, protect the privacy of the parties in an appropriate manner, provide security against retaliation, and result in effective punishment of proven offenders. Suggested mechanisms to ensure effective distribution of the policy should be included.
- Grantee institutions should also develop a sexual harassment policy. The model policy developed (see above) may be used as a template for an institution's policy, but alternate policies may also be used. This requirement may be permanent or implemented for a finite period of time, but for not less than 5 years, while its effectiveness is assessed.
- Biomedical institutions should appoint an administration official with whom students, faculty, and other employees can discuss incidents of possible harassment. This individual should be empowered to undertake informal investigation, as described in the institution's harassment policy and with all appropriate protections of both the accuser and the accused, and should also initiate formal proceedings when necessary. This individual should also be involved in appropriate training and prevention activities.
- All biomedical educational institutions should assemble a faculty-wide committee to assess institutional progress on reducing harassment and to develop new strategies as necessary. Such committees may be assigned to adjudicate cases of alleged harassment and may provide oversight for the above-described institutional official.
- Biomedical institutions should consider mechanisms for releasing information on harassment cases to the institution's community. Such information should protect the identities of the parties but at least note the incident and action taken, both to enhance awareness of the general problem and to exert a deterrent effect on potential harassers.
- Biomedical institutions should consider mechanisms to reduce the secrecy surrounding tenure, promotion, salary, and other employment decisions to minimize opportunities for both "quid pro quo" harassment and retaliation for reported harassment.

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1. U.S. Equal Opportunity Employment Commission. 29 CFR 1600-1699, 1991.

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# Understanding Power

*Cochairs:*

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## Introduction

Power in itself means nothing. Real strength lies in the capacity to lead others to achieve a meaningful agenda. Power is the ability to have control over resources—money and information—to effect change to or through other people. Power, or the lack of, is an issue that affects many women throughout their lives. Although women have entered scientific fields in numbers greater than ever before, most remain in the lower ranks of academia or industry and are relegated to non-tenure track positions or middle management. Those who do rise above these lower ranks often hit "the glass ceiling," halting their progress at the level where policy decisions are made (chief executives, vice presidents, department chairs, deans, and heads of universities).

Retention and reentry of women into biomedical and other scientific careers are significantly influenced by power issues. Prestigious awards, recognition, and advancement are all key elements to the attainment of power. If women's work is not rewarded through peer recognition and awards for significant achievements and if opportunities for advancement are not provided through tenure or promotion, women are likely to drop out of academic or biomedical fields altogether and pursue careers where the climate is less hostile. Consequently, potential contributions are lost to science and society.

If young women have few successful role models and observe that their female science teachers and professors receive less recognition, support, and encouragement than their male peers, the clear message is to pursue a career that provides more positive reinforcement. Thus, power issues also influence the recruitment of women into biomedical careers.

In many cases, women are delegated pseudopower tasks or are placed in pseudopower positions where their energies are consumed in ineffective ways, that is, in activities that are of lower status or that do not effect change. These pseudopower positions often provide the illusion of power rather than the demonstration of "real" power. This situation must be changed if women are to pursue careers in scientific fields or enter the fields that have been primarily male bastions.

Power that comes from within, that is, self-esteem and self-confidence, provides the framework on which all other forms of power are built. The potential for power exists in all of us; however, negative socialization presents overwhelming barriers to its expression in women. To paraphrase Jeanne Kirkpatrick, women are in a double bind. If a woman seems strong, she is called 'tough,' and if she doesn't seem strong, she is judged to be not strong enough to occupy a high-level job. With this in mind, the working group developed recommendations to address three key areas:

- Structure—changing institutional processes from within.
- Education—empowering women by providing the resources, knowledge, and informal power structure previously accessible primarily to men.
- Environment—changing society's attitudes toward and expectations of women who choose scientific careers.

Women encounter societal and institutional barriers to achieving power that often create a conflict between career and personal priorities. Internal barriers include:

- Fear of failure, success, rejection, isolation, reprisals, abandonment, emotional detachment.
- Lack of confidence.
- Role conflict between gender identity and professional identity.

- Conflict around differing priorities: a women's priorities are not adequately recognized, for example, child care.
- Relationships, for example, not wanting to move and leave relationships to achieve advancement.

External barriers include:

- Racism.
- Sexism.
- Lack of role models.
- Lack of support from other women and men.
- The "no promotion from within" policy of some institutions.
- Lack of access to knowledge and information about promotion, tenure, grant opportunities.
- Pressure to maintain the status quo.
- Negative societal perception of assertive women.
- Lack of adequate provision made for pregnancy and child care.

## Recommendations

This report recognizes as a top priority the need to increase the number of women in positions of power in biomedical and behavioral fields. This priority is particularly critical for minority women who inevitably encounter multiple barriers in their pursuit of leadership roles. Therefore, the working group has formulated a long-term goal that, by the year 2000, increased numbers of women will have been promoted, elected, or appointed to the following positions: deans, department chairs, research institute directors, pharmaceutical and biomedical company executives, policymakers, full professors, and officers of national professional organizations.

Achieving this goal will require strategies in four areas: structure, education, environment, and communication. The following recommendations propose actions for achieving objectives in each of these areas. They can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

*Structure*

- The accomplishments of women should be promoted to give them higher visibility:
  - — Establish a clearinghouse on women in biomedical careers (e.g., data base, hotline, computer bulletin board).
  - — Nominate women for prestigious awards.
- Pay equity should be achieved:
  - — Enforce existing pay laws.
  - — Make salary pay differences public.
  - — Accreditation agencies mandate equal pay as condition of accreditation (Accreditation Council for Graduate Medical Education, Liaison Committee on Medical Education, American Dental Association, Joint Commission on Accreditation of Hospitals).
- Tenure system changes should be initiated:
  - — Lengthen tenure "window."
  - — Provide flexibility for such life events as pregnancy, child care, and dependent care.
- Inclusion of women in power roles should be mandated, for example, accreditation site visits for Liaison Committee on Medical Education and the Accreditation Council for Graduate Medical Education, chairs of meetings or study sections, nominating committees, search committees, editorial boards.
- The number of women in leadership roles in professional societies should be increased, for example, committee chairs, delegates, trustees, and officers.
- Performances of institutions on salary, promotions, and tenure should be tracked.
- Make Federal funding contingent on:
  - — Proportional representation of women and minorities in senior positions.
  - — Achievement of pay equity.
  - — Establishment of mandatory sensitivity training programs.
  - — Active and successful recruitment of women and minorities into training programs.

- Accreditation for educational programs, including continuing education, should be made contingent on proportional representation of women in scientific programs.

*Education*

- An action plan should be initiated to help women develop self-confidence and improve leadership and management skills through workshops, fellowships, networking, mentoring, and sabbaticals.
- All members of the health professions, for example, deans, administrators, presidents, nursing staff, and ancillary staff, should be educated about gender awareness, ethnic diversity, and team building.
- Training in resource use and survival skills, for example, grant writing, should be provided.
- Health professionals should be taught flexible mediating management styles.
- The female power base should be broadened by attracting more young women to biomedical careers through the use of public education, recruitment, and professional society award programs. Efforts should be made to capitalize on work already in progress by organizations such as Girls, Inc.
- Materials for culture- and gender-sensitivity training modules should be developed.
- Education campaigns to change societal attitudes toward women in sciences should be developed.

*Environment*

- Flexible benefits packages, which include child care and family support, to allow women time to pursue and assume leadership positions should be provided.
- The autocratic power structure should be changed, that is, reframe thinking about appropriate or necessary qualifications for upper level positions. Give consideration to alternate outside experiences such as involvement with professional societies or other volunteer or leadership roles.
- Every institution should be encouraged to install a "women in science" office liaison as part of the formal administrative structure.
- The research agenda should be changed to include additional women's research issues.
- Loan forgiveness programs for women and minorities who have high indebtedness should be developed.
- A clearinghouse should be developed to perform multiple activities such as providing data on position vacancies and award opportunities.

*Communication*

- Communication and networking (e.g., conferences) at national and regional levels should be continued within and external to the biomedical community.

# Science as a Second Language: Ethnic Issues

*Facilitators:*

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## Introduction

What can be done to make women of all ages and of diverse racial, ethnic, and cultural experiences conversant with the language of science, its methodology and promise, its use as an instrument for career choices, and its use as a basis for contributing to policy development and national decisions in an increasingly technological world? In responding to this issue, the discussion group made four basic assumptions.

A first, a second, or even multiple languages can best be learned at an early age. The longer the delay, the greater the difficulty in mastering a second language. A parallel circumstance exists with science. Thus, science as a second language should begin in the family environment and be extended throughout the kindergarten to 12th-grade educational experience. Ideally, this requires knowledgeable parents and teachers who can transmit the requisite knowledge as well as the excitement of science to *daughters* and sons. It must be kept in mind, though, that science as a second language can also be learned by older people.

Second, among certain ethnic groups understanding science as a second language is a particularly acute problem because of the greater likelihood of a lack of opportunity to become interested in science within the family, because of poor schools and inadequately prepared science teachers, and because of a lack of equipment and instructional devices, such as personal computers. While the nature and content of the problem vary among ethnic groups, there are commonalities that require attention.

Third, many competitive forces work against the acquisition of science as a second language, among them hours in front of the television with its thousands of incidents of violence, murders, and sexual encounters. The discussion group assumes that this sensory overload competes with the energy required to learn science, although the influence of these factors has yet to be studied.

Fourth, the meaning and purpose of science are determined by cultural influences and the language of the specific ethnic group; therefore, the traditional language of science as a second language must consider the values inherent in the language of the ethnic group.

## Recommendations

The specific recommendations that follow can be synthesized into the following single, comprehensive recommendation. It and the specific recommendations that follow can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

- A series of competitive demonstration projects to promote an awareness, interest, and competence in science should be sponsored. These projects should have a longitudinal, controlled design that targets age groups from early childhood through adulthood. Institutions assisting and supporting the community organizations and schools participating in the demonstration project should also sponsor the project. Priority should be given to curricula that provide innovative teaching strategies and that incorporate effective science education for families and the community. Preference should be given to proposals that offer matching funds. The demonstration projects can be integrated into other existing institutional and community infrastructures in area health-education centers. An appropriate evaluation component, including a tracking system and use of valid current or new

instruments, should be required. Dissemination of outcomes would be useful in transferring the demonstration project model to other regions of the country. The purpose should include methods of procuring long-term funding for widespread adoption of the demonstration project model at the local and state levels.

The following specific concerns and recommendations led to the formulation of the above comprehensive concept:

- Collaborative programs that foster discussions with teachers to educate parents about science should be encouraged and fostered.
- Science and scientists should be brought to families and communities instead of relying on families to attend sessions at institutions. This can be achieved through a variety of mechanisms: churches and other community organizations, outreach internships with students and community leaders, and university faculty being made available as a science resource for the community.
- To motivate youths into science careers, television and radio time should be used to profile scientific achievements along with the scientists themselves as role models.
- Grants should be given to institutions to develop outreach programs for schools and to develop innovative ways of communicating information about science.
- Science should be made relevant to actual real-world circumstances; scientists should describe their work as integral to activities of daily living and to quality of life.
- Revisions in science curricula to reflect cultural influences, the increasing complexities of science, and the diversity of the performance of science for the next century should be supported and encouraged. The problems associated with communicating science as a second language reflect large disruptions in societal values, particularly family life, and lack of discipline and order, all of which are essential ingredients in the science endeavor.
- New messages of science to counteract the old stereotypes that women will have difficulties "making it" in science should be developed and disseminated. Federal agencies, foundations, and other funding institutions should sponsor programs to profile women in science (intramural scientists) and women as outstanding grantees.
- Programs that reach students who are not necessarily the outstanding A+ students in academic programs but that reach those who obtain B and C grades in science courses should be sponsored and encouraged. These students constitute a majority who can be groomed and turned on to science through innovative programs. This potential pool of future scientists is being missed in current programs.

# The Politics Mother Never Taught You

*Facilitators:*

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## Introduction

The discussion group addressed the need to educate women about the political skills necessary to succeed in the current academic world so they can change some of the rules of the game. These skills are necessary at personal, departmental, and institutional levels.

## Recommendations

The discussion group proposes that all of the following recommendations be viewed as mechanisms that could, and should, be implemented as appropriate by a wide variety of individuals and groups, including Federal agencies, professional societies, foundations, academic institutions and private industry.

- Institutions should be provided with incentives to work on career advancements for women.
- Financial incentives should be offered to those institutions that can provide evidence of promoting women at an accelerated rate so they gain equity with the promotion patterns of men. For example, grantee institutions should be required to carefully document their efforts to promote women during the past grant period. As a part of this documentation, the grantee institution should be required to provide documentation of career counseling at the departmental level. The funding institution should also require that department chairs provide their faculty with clear guidelines about the criteria for promotion and retention. If an institution does not provide evidence of accelerated promotion of women, no financial incentive would be awarded.
- Professional societies should offer workshops for women at all levels to train them in the "street smarts" or "politics" necessary for success.
- Individuals in positions of power should be educated. To this end, workshops could be held through organizations such as the AAMC or the American Association of Dental Schools and their various councils (Council of Deans, Council of Academic Societies, Council of Teaching Hospitals). During these workshops administrators, deans, and chairs could discuss strategies for attracting and retaining talented women.
- Models for successful career development should be identified. Profiles of successful women in science could be developed and disseminated.
- Research should be conducted to develop innovative practice models of professional career development for women.

# But We've Always Done it Like This: Challenging the Structure

*Facilitators:*

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## Introduction

The discussion group concurred that the most important structure to be challenged is the career advancement structure and all its elements of tenure and promotion systems and policies. The current infrastructure in many institutions discriminates against women. The strategies recommended by the group for challenging that structure include one that is straightforward and that can be implemented immediately: All institutions should fully disclose tenure and promotion practices and committee memberships.

## Recommendations

The following recommendations can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

- The sphere of professional activities that are considered in the evaluations for promotion and tenure should be expanded. Career conferences are a mechanism for balancing and rebalancing the elements of research, clinical service, community service, teaching, and administration. Recording the agreements and recommendations that emerge from such conferences is important in influencing change.
- An analysis of the timeframe for achieving tenure and promotions should be undertaken. A provocative idea that may more appropriately reflect the natural history of women in biomedical careers is the "lifespan" approach in contradistinction to the current "apex" approach. The lifespan approach would allow a decelerated pace or a constant pace during a woman's reproductive years. This pace would be offset by a longer commitment to professional work made possible by the longevity women currently enjoy in the postreproductive years. The lifespan approach is also appropriate because of the developmental time that is inherent in certain types of research. For example, development of expertise and experience and their recognition would be on a different time line for epidemiologic research as compared with clinical trials or neurobiological research. Thus, application of the lifespan approach demonstrates that when systems and structures are changed to be more responsive to women's needs they ultimately become more responsive to everyone's needs.
- An analysis of the difference between traditional academic tracks and clinical teaching tracks should be conducted. The objective would be to identify the points at which there is increased risk to the recruitment and retention of women and to plan both preventive and corrective interventions as needed.
- The rules and policies for conduct of research, publication, presentation, and evaluation should be formalized and explicitly transmitted. Organized and scheduled orientation seminars or retreats should be sponsored for students, fellows, and new faculty. To maintain access to information and to have ongoing support for work in progress, networks for mentoring should be expanded. These networks would increase the likelihood of suitable pairings for mentoring relationships.
- The issues of salary and pay equity should be directly addressed. It is often difficult to obtain information about salaries on an

institutional level, but the data should be sought as part of the development of a systematic process of equity review. Women should be encouraged to exchange information personally, but the all-too-frequent discovery of inequity cannot suffice as the stimulus for review. There should be a regular examination of the components of the salary structure—such as base, supplements, bonuses, buy-ins, and buy-outs—resulting from contracts and grants.

- A mechanism for promoting female-friendly institutions, similar to policies that have encouraged the business sector to recruit and retain women and minorities, should be developed. The first step would be to develop a survey instrument listing areas that are critical to recruitment, retention, and reentry of women in the biomedical areas. The second step would be to survey institutions, including basic science graduate programs, postgraduate medical programs, and other entities; the results of the survey would be published and disseminated. The success of this strategy lies in being prepared with the answers and recommendations for female-friendly structural change when the institutions respond with queries.
- New leadership styles should be developed. An evaluation of the usefulness of quality assessment and improvement programs as models for the insertion of a new agenda should be considered. These programs are characterized by decentralized decision making that may expand the opportunities for participation by women and other groups of professionals and researchers under-represented in policy and implementation. Similarly, these programs set new criteria for satisfactory performance; what is important is different now than in the past. There are pitfalls in this system that may result in isolation for women involved, but the model is worthy of further analysis.
- In institutions devoted to biomedical sciences, benefits packages and time-management options that facilitate meeting family and child-care responsibilities should be provided. To this end, partnerships with men must be developed that are to the benefit of all. Men can also anticipate more productive careers when obstacles to meeting family and child care responsibilities are eliminated.
- Changes in the career advancement structure should be implemented in an atmosphere of continual process review.

# Networking for Graduate Women in Science

*Facilitators:*

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## Introduction

The discussion group addressed the unique problems facing graduate women when forming, perpetuating, and effectively using networks. At the beginning of the session, the group was given a list of questions that fell into three categories: networking for personal and support reasons, networking for professional reasons, and networking for political reasons. The group was also encouraged to generate questions about the definitions and perceptions of networking. The group consisted of individuals ranging from students to deans, which added a broad perspective to analyzing the problems and proposing solutions.

The group generated a list of 18 key concerns and issues facing graduate women who try to network and ranked them in order of priority as follows:

1. How do you teach women to network?
2. What are good mentoring skills? How do you choose a mentor?
3. Networking for professional reasons.
4. Networking outside of the immediate environment.
5. How do you perpetuate networks and support groups?
6. Developing good communication skills.
7. Building coalitions among established female and minority groups.
8. How do you network in both the academic and corporate world?
9. What are the politics of networking?
10. The importance of supporting some "female-only" networking and support meetings.
11. How do you emphasize the importance of networking to new students?
12. How do you minimize the tendency of support groups to become whining sessions?
13. How do you incorporate men into your networks?
14. How can networking combat issues of isolation?
15. How do you counter the stigma associated with women's networks?
16. What are the negative aspects of mentoring?
17. What is the role of men in support groups?
18. What challenges do women's networks face as they grow larger and gain power?

Time constraints precluded lengthy discussion of every item on the original list; however, all of these ideas are important and can be used to stimulate future discussion facilitated by the ORWH.

## Recommendations

From this list, the group chose six issues for discussion. The solutions recommended below emphasize feasible solutions without regard to current existence or cost. They can, and should be carried out, as appropriate, by a wide variety of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH. The group considers the items marked with an asterisk to be the most concrete avenues for facilitating networking for graduate women in science.

*How Do We Teach Graduate Women to Network?*

- Money for women graduate students to form their own support and networking groups at the graduate level should be provided. Funding should come from Federal, institutional, professional, and local resources.
- Student slots should be placed on all important Federal advisory panels and commissions of the following agencies: NIH, NSF, the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and the U.S. Department of Agriculture (USDA).
- Social events should be held to introduce new graduate students to female faculty.
- Graduate schools should provide directories of women and men who are campus resources.
- Graduate schools and departments should encourage women to participate in professional organizations.
- Graduate schools and professional societies should provide seminars on "How to Network."
- Female graduate students should have access to practical instruction in such issues as how to write a resume or training in communication skills.

*Mentors: How to Choose One, How to Be One*

Graduate schools, professional societies, and Federal agencies should work together to:

- Provide guidelines to graduate women on evaluating and choosing mentors.
- Develop formal instruction for faculty on mentoring skills.
- Encourage women to work for and support one another.
- Establish a clear definition of the term "mentor." (The group defined a mentor as an honest critic.)

*Networking for Professional Reasons*

- Institutions should provide information necessary for promotion to demystify the process of advancement. Departments could make available to graduate students the curricula vitae of individuals in senior-level positions.
- Individuals should be encouraged to network to learn about essential job skills, recruitment opportunities, and alternative career paths.
- Individuals should be encouraged to network to find out about the "scoop" on actual or projected environments such as prospective laboratories and institutions and to facilitate transitions by making contacts at a new location.

*Networking Outside of the Immediate Environment*

- National graduate networking in conjunction with professional organizations should be created and encouraged.
- Shadowing programs in nonacademic settings, especially in private industry and Federal agencies, should be established.

*How to Perpetuate Existing Networks and Support Groups*

- Support groups created by graduate women should create ongoing mechanisms of systematic outreach. For example, have every department that invites a female speaker send a letter asking her to contact the graduate women's group.
- Graduate women support groups should be encouraged to remain productive and professional; especially important is documenting what the group has done and how they did it.
- Graduate women support groups should periodically reevaluate their mission; assumptions on which the group was based may change and the need for such a group may decline.
- Stagger officer positions so that both incoming and outgoing students participate in the organization of the group.
- Establish formal liaisons between the support group and the institution's administration.
- The university should provide public relations programs for graduate women's groups.

*Communication Skills*

- Graduate schools should provide forums for students to simulate oral and written presentations in an atmosphere of constructive criticism, even at the early stages of graduate education. These forums could include: verbal and written skill courses, peer review, mentor participation as critiques, videotaping exercises.

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# Why Not a Women's Health Specialty?

*Facilitators:*

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## Introduction

***What Are the Special Needs of Women?***
Women themselves are demanding improved health-care services and answers to questions about issues affecting their health. Recent studies and reports have revealed that women's health needs are not being adequately met in the health-care system. It also is often the case that women do not receive appropriate diagnostic and treatment interventions. To a large extent, inappropriate care results from inadequate medical training. For example, physicians are not taught that women have special and separate health-care needs and that gender may account for differences in the presentation, manifestation, clinical course, and treatment of illnesses. In addition, health-care professionals have not been trained to consider critical variables when treating women, including biological and psychosocial factors unique to men and women, that affect vulnerability or protect against specific illnesses. In addition, some physicians view their female patients paternalistically, thereby obviating the exchange of vital information between doctor and patient.

Other factors, such as access to health care, education, and socioeconomic status are recognized as important determinants in women's health. Because women bear and raise children, they require greater access to health care and place greater demands on the system than do men. Women must be well educated about health and disease prevention because they are in a position to educate the young and raise generations of health-conscious adults. Issues of education and access are especially crucial for women of low socioeconomic status because they are most likely to be uninformed about health care or unable to afford health-care services in the current system.

Girls and women live longer than do men, yet they experience greater disability from diseases compared with men. Women also have specific health-care needs across the life cycle that require special attention such as those encountered during menstruation, pregnancy, and menopause. Therefore, at all stages of the lifespan, an emphasis must be placed not only on the diagnosis and treatment of disease but also on wellness, education, health promotion, early detection, and disease prevention.

***Is a Women's Health Specialty Needed?***
The discussion group concluded that the need for a separate women's health specialty is an evolving issue. While knowledge is increasing about gender differences in health and disease, the critical mass of scientific knowledge necessary to warrant the development of a women's health specialty has not yet been achieved. Nevertheless, a strong case can be made to add training on a broad spectrum of women's health issues to the framework of existing specializations: family practice, obstetrics and gynecology, internal medicine, surgery, neurology, and psychiatry. Courses of various breadths, depths, and intensities should be developed *now* to respond to the present demand for additional learning and information. Continuing education credits should accompany such training while the future direction of a women's health specialty is carefully planned. In addition, comprehensive women's health-care centers should be established to coordinate health services across medical center departments.

The discussion group recognized that issues in women's health must be taught in medical schools and that changes in curricula are needed to increase sensitivity to these concerns. This kind of teaching and sensitization to gender differences in health would require

a substantial commitment from medical school deans and faculty.

Finally, the discussion group concluded that the development of a women's health curriculum leading to board certification in women's health, either as a subspecialty within an existing medical specialty or as a free-standing specialty, should only occur after the development of a strong scientific base in gender health and disease. In the meantime, the group recommended short- and long-term goals to develop training courses within specialties, to develop curriculum plans that would be recommended to medical school curriculum committees, and to work toward a reconsideration of the need for establishing women's health as a medical specialty.

## Recommendations

The following recommendations can, and should, be carried out, as appropriate, by a wide variety of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

***Strategies for Achieving the Goal of Developing a Specialty in Women's Health***
To achieve this goal, the discussion group recommends that a task force be formed to:

- Identify, collect, and organize what is currently known about health issues as they pertain to women and about gender differences in the etiology, treatment, and prevention of illnesses.
- Make recommendations to incorporate this information into:
  - —Continuing medical education for current practitioners across specialties.
  - —Medical school and residency curricula, including rotations in women's health and the development of model curricula.
  - —Subspecialization in women's health with fellowship training in each specialty.
  - —Multidisciplinary fellowship training in women's health with certification.
  - —Multidisciplinary institutional training of grants on women's health.
  - —Questions for certification on women's health in the examinations of the National Board of Medical Examiners and specialty board examinations.

In conclusion, the discussion group underscored the urgent need to mainstream the teaching of gender differences in the etiology, treatment, and prevention of illness into the curriculum of health-care professionals and specialists. This focus must include an emphasis on health promotion and disease prevention. These fundamental changes in medical education will lead to a substantial improvement in the health care of women in the United States today.

# Building Support Structures—Keeping Your Sanity

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## Introduction

Women in science have assumed nontraditional roles and identities. These roles often seek to combine private and professional, traditional and nontraditional role expectations. These multidimensional roles require support and validation. Unfortunately, there is no established prescription or model for identifying, developing, and maintaining these support systems for women. Established models that have evolved for men appear to be either inappropriate, incomplete, or inaccessible for most women in science.

In an energetic, dynamic, and spirited discussion, the group explored several facets of support issues, including formal and informal dimensions, organizational dimensions, personal dimensions, barriers to social support, and resources for women. The group identified 10 major barriers that women encounter in building successful support structures and made recommendations for overcoming each barrier.

## Barriers

### *Personal Internal Perceptions, Feelings of Lack of Power and Inadequacy, and the "Glass Ceiling" in an Established, Male-Dominated Professional Community*

Despite a seemingly level playing field at the beginning of a professional education, women seem to experience higher levels of interpersonal sensitivity, depression, anxiety, and a greater sense of lack of power than their male peers. These feelings, conditions, and perceptions are compounded because women also experience role conflict. They receive less support from families, friends, and the professional community and lack role models and networking opportunities. The glass ceiling has been described as watching men being promoted to the next step while women linger at each rung of the professional ladder twice as long as men who have half the qualifications.[1] These invisible barriers prevent women from achieving their potential, reduce self-esteem and self-confidence, and result in frustration and inadequate compensation. These conditions produce professional loneliness in an absence of supportive collegial relationships. The glass ceiling is verified by statistics indicating that women are overrepresented in nontenure-track positions such as adjunct faculty and lecturer and are underrepresented higher up the career ladder. Unemployment rates also are higher for women in almost every scientific field. Women earn less than men at every stage of their scientific careers, and the disparity increases at the highest levels of experience.[2] To succeed in professional scientific circles, it is essential that women feel welcome and receive nurturing, mentoring, and support from their peers and senior colleagues.

### *Gender Differences in Communication and Lack of Conflict Resolution*

Men and women, even in academic and professional arenas, do not always communicate on the same "wavelength." Communication differences and misunderstandings arise through innuendoes, social comments, and direct interactions. Women are not likely to have other women as department heads or chairs with whom they can discuss these concerns and perceived differences. This failure to clarify a question or issue in its early stages is compounded with the passage of time and levels of frustration. Too often either side reaches the conclusion that the other is incompetent or inept because of a simple failure to clarify and understand each other. Support networks provide a mechanism for women to discuss and ascertain possible interpretations of such professional encounters.

***Shortfalls of the Mentoring Process for Women***
Mentors have traditionally been a source of personal and professional support for young men advancing in scientific circles. Several studies have identified the beneficial effects of mentoring on career success across professional specialties.[3] The model has failed women, particularly minority women.[4] All women entering scientific circles need a mentor to serve as a resource in career advancement, graduate opportunities, and credential support. A lack of women in high levels to mentor younger women is problematic. Senior male faculty, with limited time, may be less likely to select a woman to mentor than to select a man who is more like himself. Personal bias, conscious or subconscious, may influence the selection of a protege who is of the same sex or race. Bias is further compounded by the expectation that women are less likely to succeed anyway, and a self-fulfilling prophecy occurs when the woman does not receive proper mentoring.

***Lack of Knowledge About Negotiating an Academic Ladder***
Women remain underrepresented in the senior ranks of academic science and medicine. Reports from the AAMC show that women in general and minority women in particular do not attain the higher academic ranks in proportion to their numbers, years of service, or eligibility. They found that this problem is neither related to the percentages of women graduating from medical school nor to their participation in academic medicine but is a function of their failure to be promoted.[5] Women usually are neither nurtured nor mentored in the formal and informal strategies for academic success, including the development of a strong curriculum vitae, the establishment of a network of professional colleagues, an understanding of department goals and objectives, and the refinement of skills necessary to succeed in academia. An effective social support system can significantly help professional women deal with these issues.

***Negative Attitudes of Trainer and Supervisor***
Sexism still prevails throughout academic and scientific communities through such comments as women "don't have the right stuff," "inherently can't succeed," or "lack a personal and professional commitment to succeed." Other attitudes such as simply ignoring women or treating them as invisible peers also prevail. Such trainer or supervisor attitudes create additional hurdles and roadblocks to professional advancement and further emphasize women's needs for support services and networks that afford an opportunity to release pent-up frustration and pursue limited possible avenues of recourse.

***Role Conflict***
Gender differences in reproductive function and role conflict with this function clearly complicate and restrict the professional advancement of women. The decision to marry and have children often is seen as evidence of a weak commitment to a career and to the organization, although women argue that their efforts to remain in professional activities while concurrently fulfilling family obligations is testimony to an exceptionally strong commitment to the discipline. Women emphasize that standards for promotion or advancement should *not* be diluted for women; however, policies that maintain qualitative standards and still permit women to be mothers should be considered. Suggestions included a revision of tenure schedules, incorporation of flexible work schedules or leave schedules, and provisions for child care as possible solutions to address role-conflict issues.

***Inadequate or Nonexistent External Support Systems***
The use of established support systems by professional women is inconsistent. Although some effective support systems are in place because of the efforts of a few selected energetic and committed women, a lack of external support systems is more typical. Professional organizations are considered prime external support systems; however, they tend not to always meet the needs of women. Women's specialty groups provide an opportunity for social contacts and for representation in the leadership of a specialty and help women enter and advance in the specialty. By becoming organized, women are more visible in their specialties and have more opportunities for advancement. In spite of these advantages, women may resist involvement in external systems or professional group activities

because they have not been socialized or encouraged to join. because they feel that the groups are insensitive to their complex needs, or because they feel already overextended and overcommitted with the demands of their multiple roles. For example, an American Medical Association (AMA) task force found that women have little time for involvement in support systems because of other obligations, primarily home and family responsibilities. They also found that women do not feel that they have equal opportunity in the professional organization either because of sex discrimination or their own sense of unpreparedness to assume leadership positions.[6]

*Unrealistic Expectations*

Previous generations of women felt that they were limited to maternal and spousal roles, and today's young women face an equally imposing stereotype of being a "superwoman" who can be everything, a prestigious scientist and sensitive mother, at the same time. While many women have managed to successfully juggle such a demanding lifestyle, the costs of such "success" are often high and hidden. It is neither reasonable nor appropriate that all women aspire to this current model. Young professional women need support services to help them prioritize professional and personal goals, obligations, responsibilities, and rewards. Unrealistic expectations are present in the professional arena as well. Many women expect that the accomplishment of a next professional hurdle will enable them to resume a somewhat "normal" existence; for example, the attainment of tenure is seen as the single essential entry item into an equalized pool of professional activity and opportunity. Unfortunately, each accomplished hurdle appears to reveal additional hurdles demanding even higher levels of time, commitment, and inequality. Support, in the form of insight and reality orientation, would help to significantly address the cycle of never-ending hurdles for women.

*Nonexistent Internal Support Systems—A Failure to Put "Self" First*

While the multiple demands on professional women compound on a daily basis, personal time diminishes. Support resources often help a woman to reconsider her personal needs and determine them to be of importance among the other multidimensional demands on her life.

*Lack of Knowledge About Available Resources for Professional Women*

For all the reasons identified above, women have little time and little confidence that resources are available to facilitate professional advancement and provide personal social support. There is a need for greater sharing and heightened awareness of available resources at local and national levels for professional women.

## Recommendation

The discussion group made recommendations about several major national research issues to further understand the multidimensional facets of professional support for women.

- Opportunities such as this workshop should be repeated in order to exchange information and support.

This workshop provided an intensive opportunity for women to collectively address many of their shared concerns, perspectives, insights, and experiences about issues of professional advancement. The evening session on social support was equally intense and productive. Additional opportunities with more focused objectives will continue to generate ideas, support, and mechanisms for the continued advancement of women in professional arenas.

- Reentry, retention, and recruitment issues for women as a specific national research agenda item priority should be identified.

Although the focus of this session was social support, it is apparent that social support cannot be assessed as a separate entity from the spectrum of reentry, retention, and recruitment issues faced by professional women. It is proposed that these issues be considered as a specific national research agenda item priority.

- Disparities and inequities for women, with a particular emphasis on minority women, in the scientific community should be identified. Mechanisms to address specific identified disparities such as the "leaking pipeline" should be defined and evaluated.

Although issues of disparity and inequities in science extend far beyond issues of salary, it is noted, for instance, that women in medical

practice earned $0.62 for every $1.00 earned by male colleagues.[7] The majority of women in medical schools are clustered in the lower academic ranks.[8] The impact of the "leaking pipeline" on women's self-esteem and access to professional advancement requires evaluation. For example, although 45 percent of students entering neuroscience graduate programs in the past decade have been women, only 38 percent of the Ph.D.s in the field go to women. The trend continues downward into postdoctoral training and faculty positions, with women holding 18 percent of tenure-track positions.[9]

- Specific sources of support that facilitate women's professional development should be identified.

In recent years, some women have inched their way over hurdles and obstacles to senior levels of professional success. An understanding of the mechanisms that facilitated (or compromised) their advancement would be beneficial for young women entering the professional pipeline. An especially important variable of consideration is the identification of effective support systems that can influence professional advancement.

- An understanding of the "abused cycle" of professional development should be developed and a mechanism for dispelling it should be identified.

The discussion group noted that the women who survive the rigors of professional advancement are not necessarily more sensitive to the needs of younger women entering and struggling to survive in scientific environments. It is not understood why this pattern continues and what mechanisms are needed to dispel or break the "cycle of abuse." The present practice of requiring each woman to blaze her own trail is insensitive and unproductive.

- Strategies, techniques, and guidelines for mentoring of women should be developed. A training manual about mentoring should be designed and developed, and national or regional workshop(s) on mentoring, the promotion of specific mentoring skills development, and the evaluation of these efforts should be offered.

Although mentoring is a crucial component of professional maturation, most women are denied the maximum level of benefits from the process. Few women are present in the upper echelons of the scientific and academic community, and there is a perception that men feel more comfortable mentoring other men. A recent study of female scientists found that many women lack mentors and that those who do have guides find them later in life than do their male counterparts.[10] Evaluation should be conducted on strategies to address aspects of the mentoring problem such as changing attitudes among male scientists, providing incentives for mentoring, increasing the number of women in strategic senior positions, and creating innovative support networks among women.

- An understanding of the impact of gender and cultural communication differences on professional levels and professional issues should be developed.

Although gender and cultural communication differences exist in professional issues, there is little insight about the specifics of these differences and their impact on professional levels and issues.

- Strategies to develop bidirectional gender understanding from a communication perspective should be developed.

In recent years, numerous popular publications have addressed gender differences in communication styles, patterns, and meanings. Clearly these differences are not limited to spousal or family relations. Yet little, if any, research data are available for female and male professionals to better understand each other through effective communication. Strategies that promote better bidirectional understanding between women and men may help address some of the current disparities and facilitate the enhancement for social support.

In summary, to eliminate the traditional patterns of paternalism, distrust, confusion, misconception, and prejudice experienced by professional women, social support systems and networks must evolve to guide and nurture professional women in scientific arenas.

Talented young women need encouragement and support to enter scientific career paths and an opportunity for personal growth and professional advancement as they struggle for a level playing field.

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# The "Old Boys Network"—Not For Old Boys Only

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## Introduction

Networking, personally and professionally, is a critically important activity for women in biomedical careers, yet this activity seems to be poorly understood and underused by women in general and especially by women in biomedical careers. The discussion group looked at the model of the stereotypical "Old Boys Network" as one that has been successful for its participants and as an example to stimulate discussion and concluded that, despite its exclusionary versus inclusionary approach, the Old Boys Network provides many practical approaches for women as individuals. Strategies to use networking to address the issues of recruitment, retention, reentry, and advancement of women in biomedical careers were also discussed.

Networking is establishing and developing a set of formal and informal relationships among loosely connected individuals for mutual benefit outside of any organized structure but familiar and accessible to all within the group. This definition was built on several familiar metaphors (both formal and informal): the biologic model of the neural network; the financial model of investments analogous to making deposits and withdrawals from "the bank"; the sociologic model of dating, particularly "matchmaking"; the medical model of sexually transmitted diseases, that is, once you initiate a contact with someone, you are then indirectly connected with all of their contacts and their contacts' contacts.

A number of concepts and approaches are key to successful networking:

- Networking is an *attitude* as well as an *activity*.
- It is important to focus on the difference between the terms "networking" (an activity) and "networking tools" (things that can be used to facilitate networking).
- Networking is built on the principles of establishing relationships, not "swapping favors."
- Communication is the hallmark of networking.
- There are differences, similarities, and overlaps of personal and professional networking.
- Networking is carried out on many different levels: one-on-one, local, regional, national, and international.
- Professional networking is best carried out within an organizational framework, for example, through the American Medical Women's Association (AMWA).
- Networking between organizations yields to the formation of coalitions, for example, the Coalition for Women's Health.
- Networking is, preferably, inclusionary versus exclusionary.
- Networking is initiated and facilitated by activity and individuals assuming responsibility to help colleagues.
- Critical factors for successful networking are *followup* and *follow through*.

Networking is *not*: manipulating; mentoring, although mentors are often a key entree into established networks; seducing; power playing.

The different types of networking may be based on preset goals that an individual or organization has for the relationship. However, the group agreed that the preferred type of networking is that done with the general goal of mutual personal and professional benefits. Several styles of networking exist, including vertical (both up and down), horizontal (among peers), and, ideally, cross-sectional or matrix patterned.

The Old Boys Network is an established subculture of its own. Hallmarks of male networking behavior are that they do it constantly, informally, subconsciously as well as consciously, socially, casually, continuously, leisurely, and nonjudgmentally. The "old boys" are joiners and leaders. Their sports, clubs, and organizations provide excellent networking opportunities and commonalities among individuals.

In considering the barriers to networking, four important caveats must be kept in mind. These barriers are generalizations: some are internal, self-imposed, or self-perpetuated, while others are external. Whether these barriers are "real" or "perceived," they have the same effects; not all of these barriers need to be changed, but women need to recognize them.

The following factors cause barriers:

- Lack of access to the places men network.
- Paucity of female mentors or mentors for women.
- Lack of knowledge and understanding about networking and why it is important.
- Lack of time for yet another activity.
- Conflicting priorities.
- Confusion between networking and seduction or manipulation.
- Fear of networking as gamesmanship or inappropriate.
- Effect of "time out" on losing one's place in an established network.
- Limited participation or membership in organizations.

## Recommendations

The following recommendations constitute strategies for successful networking to be carried out by individuals in general as well as by groups such as professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

### *General Strategies*

- The Nike approach: Just Do It!
- Change your attitude.
- Make "friends" before you need them.
- Do something for someone else without expecting anything in return.
- Volunteer.
- Join professional societies.
- Communicate interest.
- Ask: How can I participate?
  - — Serve on committees.
  - — Aim for elected office.
  - — Help someone else earn elected office.
- Followup or follow through.
- Initiate new contacts.
- Reinitiate old contacts.
- Give credit when and where it is due.
- Remember your importance and the valuable contributions you can make to others.
- Use these important tools:
  - — Business cards.
  - — Congratulations or thank-you notes.
  - — Computer networks.
  - — Invitations to speak at your institution or to be a visiting professor at your institution.
  - — Memberships in professional organizations.
  - — Membership lists or directories of your organizations.
  - — Data bases.

### *Networking Strategies Within Professional Societies*

- Use "Women In _____" committees as stepping stones for increased visibility for women within specialty societies, for example, Women in Nephrology. If your society does not have such a group, consider starting one.
- Create data bases, for example, "Women Speakers on Osteoporosis."
- In starting societies and committees, hire professional staff whenever possible.

- Share access to your data bases with others.
- Establish good relationships with staff members of organizations.

*Networking Strategies Within Academic Institutions*

- Seek advice from peers or superiors through information interviews, for example, "Do lunch."
- Establish good relationships with your own and other colleagues' support staff, thus giving you access to their network.
- Disseminate information about outside conferences, for example, send announcements and past conference reports to appropriate, interested individuals.
- Join or start women's groups or chapters of national organizations, for example, the Association for Women in Science, the AMWA, and the American Association of University Women (AAUW).

*Other Networking Activities*

- Create and maintain nationwide data bases on:
  - — Scientific or medical experts in various fields.
  - — Training opportunities and fellowships in women's health.
  - — Reentry positions available.
  - — Candidates for reentry positions.
  - — All medical and scientific organizations with a focus on women or women's health or with a women's committee.
  - — Senior female candidates interested in department chair positions or dean positions.
- A followup conference on recruitment, retention, reentry and advancement of women in biomedical careers should be held. This conference would expand on ideas discussed in the June 1992 workshop and would focus on practical tools for recruitment, retention, reentry, and advancement of women in biomedical careers. Ideally, it would be held regionally or disseminated to all institutions by teleconference or videotape.

  Specific workshop topics might include:

  - — "Know the NIH": an overview of NIH's organizational structure, how it works, who works where, and intramural versus extramural activities.
  - — How to write a research grant proposal.
  - — How to learn about funding opportunities ("What is an RFA anyway?").
  - — Opportunities for industry funding of clinical research proposals and how to access it.
  - — How to get on "The Speakers' Circuit."
  - — Strategies for achieving tenure.
  - — How to negotiate your salary.
  - — Networking for fun and profit.

*Networking with Politicians*

Networking with politicians was discussed only briefly because of time constraints, yet the group agreed that this is the classic example of the success of the Old Boys Network in action. There was also consensus that women in biomedical careers have, in general, overlooked the importance of this, both locally and nationally. Most important, we have overlooked our own credibility and potential influence just by virtue of our advanced degrees. There was general consensus that women must follow Dr. Maxine Singer's admonition to reclaim their rightful positions as experts not only in women's health but also in health care, not only as female scientists but also as scientists. Mention was also made of the fact that there is one U.S. Congresswoman with a science background, Louise M. Slaughter (D-NY), a bacteriologist with a master's degree in public health, and that the Libertarian U.S. vice-presidential candidate is a female physician. Many women also serve as science and health advisors to regional and national politicians. This demonstrates that women in biomedical careers can use their networking skills not only to influence politicians but also to become them. These examples illuminate the diverse benefits of networking for women in biomedical careers.

# Women, Research Thyselves: Women Researching Women's Health Issues

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## Introduction

The discussion group addressed two issues: What topics in women's health ought to be studied? What would be needed to have more women involved in researching women's issues and what impact would it have on the nature and quality of research?

## Recommendations

The following recommendations can, and should, be carried out, as appropriate, by a wide range of individuals and groups, including professional societies, academic institutions, foundations, private industry, Federal agencies, and the ORWH.

***Encourage Women to Do Research on Women's Health Issues***

Women should be free to work on whatever research activity they choose, as should men; however, it would be desirable to encourage women to do research on women's health issues because women often have a different understanding and perception of research ideas than men and may be more sensitive to the needs of women. There should be a concerted effort to increase the number of women doing research on women's health issues.

- Develop mechanisms that allow institutions applying for research funding to be recognized for providing departmental support for women in their grant application process and for providing institutional resources for women investigators.
- Develop mechanisms for tracking the number of women who submit grants as principal investigators.
- A fellowship to train women, including minority women, to do research in women's health issues should be established.

***Increase the Number of Female Principal Investigators***

Women need better preparation and assistance to make the transition from associate to principal investigator.

- Grants should be established specifically for young female investigators who are competing as principal investigators for the first time.
- A mechanism to recognize grants that have women as principal investigators should be established.
- A representative of female investigators on grant applications, particularly as they relate to women's health, should be encouraged and facilitated.
- Mechanisms should be developed to fully recognize the investigators other than the principal investigator who may actually develop and conduct the research.
- The promotion of women into positions of principal investigator on research projects should be encouraged.

***Increase the Numbers of Women and Minority Women Study Subjects in Clinical Protocols***

Protocols in which women investigators are active will be more successful in recruiting these participants.

- Fellowships to train female and minority women health professionals and scientists in research should be established.

***Clinical Research Is Essential and Needs Support***

The discussion group agrees that clinical research can be both labor intensive and difficult. The group believes that women are well equipped to do this research but need protected time and credit toward promotion for these activities.

Alternatives to the classic research track should be pursued.

- Set-aside monies should be established to fund grants that specifically assist in the transfer of technologies pertaining to women's health issues into clinically related research efforts. Priority should be for population-based studies and studies on the health issues of women and children.

***Increase the Number of Women in Positions of Power and Who Are Able to Help Other Women Become Knowledgeable About the Grant Application Process***

- Women should be appropriately represented on research application study sections.

***Continue to Add Research Opportunities to the ORWH's Research Agenda for Women***

The discussion group acknowledged that, in addition to the detailed research agenda that was developed in Hunt Valley for the ORWH, there may remain significant research opportunities that pertain to women's health.[1] These should continue to be identified and pursued.

- Make funding available for innovative grants in areas of women's health research.

**Reference**

1. National Institutes of Health. Report of the National Institutes of Health: opportunities for research on women's health. Bethesda, Maryland, 1992; NIH pub. no. 92-3457.

APPENDIX 1

# Task Force Roster

Resource Center

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*Office of Research on Women's Health*

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*Bethesda, Maryland*
*June 11–12, 1992*

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APPENDIX 3

# AGENDA

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## AGENDA

*National of Health*
*Office of Research on Women's Health*

*Women in Biomedical Careers: Dynamics of Change, Strategies for the 21st Century Workshop*

*Bethesda, Maryland*
*June 11–12, 1992*

### Wednesday, June 10

| | | |
|---|---|---|
| 3:00 pm-9:00 pm | **Registration**<br>*Grand Ballroom Foyer* | |
| 4:30 pm | **Reception Transportation—Buses Depart**<br>*Grand Ballroom Foyer Entrance* | |
| 5:30 pm-7:00 pm | **Reception With Members of the Congressional Caucus for Women's Issues**<br>*Rayburn House Office Building Washington, D.C.* | |

### Thursday, June 11

| | | |
|---|---|---|
| 7:00 am | **Registration**<br>*Congressional Ballroom Foyer* | |
| 7:30 am-8:00 am | **Continental Breakfast**<br>*Congressional Ballroom Foyer* | |
| | **Plenary Session**<br>*Congressional Ballroom* | |
| 8:00 am | **Welcome** | Vivian W. Pinn, M.D.<br>Director<br>Office of Research on Women's Health<br>National Institutes of Health |
| 8:15 am | **Background/History** | Ruth L. Kirschstein, M.D.<br>Director<br>National Institute of General Medical Sciences |
| 8:30 am | **Overview and Workshop Charge** | Carola Eisenberg, M.D.<br>Task Force Cochair<br><br>Shirley Malcom, Ph.D.<br>Task Force Cochair |
| 8:45 am | **Panel I**<br>**Recruitment, Retention, and Reentry** | ***Comoderators:***<br>Shirley McBay, Ph.D.<br>President<br>Quality Education for Minorities Network |

| | | |
|---|---|---|
| | | Preston A. Littleton, Jr., D.D.S., Ph.D.<br>Executive Director<br>American Association of Dental Schools<br><br>*Panelists:*<br>Linda M. Bartoshuk, Ph.D.<br>Professor of Surgery<br>Department of Otolaryngology<br>Yale University<br><br>Anne Morris Hooke, Ph.D.<br>Associate Professor<br>Department of Microbiology<br>Miami University<br>Chairman of the Committee of the Status of Women in Microbiology<br>American Society of Microbiology<br><br>Luther S. Williams, Ph.D.<br>Assistant Director for Education and Human Resources<br>National Science Foundation |
| 10:00 am | **Break** | |
| 10:15 am | **NIH Director's Address** | Bernadine Healy, M.D.<br>Director<br>National Institutes of Health |
| 10:45 am | **Panel II**<br>**Advancement and Workplace Climate** | *Comoderators:*<br>Carol A. Aschenbrenner, M.D.<br>Executive Associate Dean<br>University of Iowa College of Medicine<br><br>Donald R. Mattison, M.D.<br>Dean and Professor<br>University of Pittsburgh Graduate School of Public Health<br><br>*Panelists:*<br>Jane G. Schaller, M.D.<br>David and Leona Karp Professor and Chairman<br>Department of Pediatrics<br>Pediatrician in Chief<br>Floating Hospital for Infants and Children<br>New England Medical Center Hospitals<br><br>David M. Brown, M.D.<br>Professor<br>Laboratory of Medicine and Pediatrics<br>Dean, Medical School<br>University of Minnesota<br><br>Helen M. Free, D.Sc.<br>Professional Relations Consultant<br>American Chemical Society<br>Miles, Inc. |

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|---|---|---|
| 11:45 am | **Panel III**<br>**Abuses of Power in the Workplace** | *Comoderators:*<br>Roger J. Bulger, M.D.<br>President and CEO<br>Association of Academic Health Centers<br><br>Lillian Gonzalez-Pardo, M.D.<br>President<br>American Medical Women's Association<br>Clinical Professor in Pediatrics and Neurology<br>University of Kansas Medical Center<br><br>*Panelists:*<br>Nancy E. Gary, M.D.<br>Senior Medical Advisor<br>Health Care Financing Administration<br><br>Rebecca Vigil-Giron<br>Executive Director<br>New Mexico Commission on the Status of Women<br><br>Marjorie P. Wilson, M.D.<br>President and CEO<br>Educational Commission for Foreign Medical Graduates |
| | **Luncheon Program**<br>*Grand Ballroom* | |
| 12:45 pm-1:45 pm | **Keynote Address** | Maxine F. Singer, Ph.D.<br>President<br>The Carnegie Institution of Washington |
| 2:00 pm-6:00 pm | **Concurrent Strategy Development Sessions** | |
| | Education<br>(Prenatal - 8th Grade)<br>*Montgomery Room* | *Cochairs:*<br>Bonnie J. Brunkhorst, Ph.D.<br>Professor<br>Institute for Science Education<br>California State University<br><br>Catherine J. Didion<br>Executive Director<br>Association for Women in Science<br><br>*Participants:*<br>Roselyn Payne Epps, M.D., M.P.H.<br>Expert<br>National Cancer Institute<br>National Institutes of Health<br><br>Susan Morris Shaffer<br>Director<br>Sex Equity Program<br>American University |

Lois Steele, M.D.
Research Medical Officer
Indian Health Service

Cecily Cannan Selby, Ph.D.
Professor
New York University

Education
(9th - 12th Grade)
*Democracy Room*

***Cochairs:***
Donna Deyhle, Ph.D.
Associate Professor
Department of Educational Studies
University of Utah

Ellen C. Weaver, Ph.D.
President
Association for Women in Science

***Participants:***
Catherine L. Abeita, M.A.
Director of Pre-College Programs
American Indian Science and
Engineering Society

Carol Hollenshead, M.A.
Director
Center for the Education of Women
University of Michigan

Deanna Naranjo
Senior Health Specialist
Hispanic Health Liaison Project
National Council de La Raza

Winona Simms, M.Ed., Ph.D.
Coordinator
Diversified Students Program
Department of Psychology
Oklahoma State University

Kay Tokunage, Ph.D.
American Association for Asian
Pacific American Education

Education
(Undergraduate - Doctoral)
*Kensington Room*

***Cochairs:***
Susan Baserga, M.D., Ph.D.
Post-Doctoral Fellow
Department of Molecular Biophysics
and Biochemistry
Yale University School of Medicine

Rosalie Sagraves, Pharm.D.
Associate Professor of Pharmacy
University of Oklahoma College of Pharmacy

*Participants:*
Jean A. King, Ph.D.
Research Scientist
Department of Psychology
Emory University
Board of Directors
National Black Women's Health Project

Carol B. Muller, Ph.D.
Assistant Dean
Thayer School of Engineering
Dartmouth College

David J. Prieur, D.V.M., Ph.D.
Professor and Chair
Department of Veterinary Microbiology
and Pathology
Washington State University

Tina Settineri
Graduate Student
Department of Pharmaceutical Chemistry
University of California, San Francisco

Melvin Webb, Ph.D.
Dean of the School of Education
Clark-Atlanta University

Education
(Undergraduate - Health
Professional Degrees)
*Grand Ballroom*

*Cochairs:*
Mary O. Mundinger, Dr.P.H.
Dean
Columbia University School of Nursing

Lila A. Wallis, M.D., F.A.C.P.
Founder and First President
National Council on Women in Medicine, Inc.
Past President
American Medical Women's Association
Clinical Professor of Medicine
Cornell University Medical College

*Participants:*
Ethel Connolly, D.V.M.
Private Practice

Mary Ellen Jones, Ph.D.
Kenan Professor of Biochemistry
University of North Carolina
at Chapel Hill School of Medicine

Filomeno G. Maldonado, M.A.
Director of Admissions
Office of Student Affairs
Texas A&M University
College of Medicine
Hispanic Centers for Excellence

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|---|---|
| Women's Colleges: Their Role in Preparing Women Scientists<br>*Chesapeake Room* | ***Cochairs:***<br>Jadwiga S. Sebrechts, Ph.D.<br>Executive Director<br>Women's College Coalition<br><br>Laura E. Nathan, Ph.D.<br>Associate Professor of Sociology<br>Mills College<br><br>***Participants:***<br>Shelia A. McClure, Ph.D.<br>Associate Professor of Biology<br>Spelman College<br><br>R. Steven Schiavo, Ph.D.<br>Academic Director<br>Professor of Psychology<br>Wellesley College<br><br>Sandra Williams, Ph.D.<br>Professor of Biology<br>Simmons College |
| Reentry and Nontraditional Pathways to Success<br>*Kenwood Room* | ***Cochairs:***<br>Stephanie J. Bird, Ph.D.<br>Past President<br>Association for Women in Science<br>Special Assistant to Associate Provost<br>Massachusetts Institute of Technology<br><br>Judith K. Gwathmey, V.M.D., Ph.D., F.A.C.C.<br>Associate Professor of Medicine and Physiology<br>Harvard Medical School<br><br>***Participants:***<br>Alice J. Dan, Ph.D.<br>Professor and Director<br>Center for Research on Women and Gender<br>University of Illinois at Chicago<br><br>Barbara Herbert, M.D.<br>Fellow<br>The Bunting Institute<br>Radcliff College<br>Assistant Professor<br>Department of Community Medicine and Socio-Medical Sciences<br>Boston School of Medicine |
| Reentry and Nontraditional Pathways to Success | Helen Rodriguez-Triás, M.D.<br>Consultant in Health Programming<br>President Elect<br>American Public Health Association |

Workplace Climate:
Internal Factors Which
Affect Women—Family
Issues, Pay Equity
*Congressional Room*

***Cochairs:***
Althea Alexander
Assistant Dean
Minority Student Affairs
University of Southern California
School of Medicine

Dorothy A. Starr, M.D.
Chair
Women in Medicine Advisory Panel
American Medical Association

***Participants:***
Sarah L. Berga, M.D.
Assistant Professor of Obstetrics,
Gynecology, and Reproductive
Sciences and Psychiatry
Magee Women's Hospital
University of Pittsburgh

Martha Cortés, D.D.S.
Private Practice
Regional Director
Hispanic Dental Association

Meryl S. LeBoff, M.D.
Director
Skeletal Health and Osteoporosis Clinic
Associate Physician
Brigham and Women's Hospital
Assistant Professor of Medicine
Harvard Medical School

Erin E. Tracy, M.D.
Resident Physician
Department of Obstetrics and Gynecology
State University of New York at Buffalo

Valerie N. Williams, M.P.A.
Associate Dean
University of Oklahoma
College of Medicine

Workplace Climate:
External Factors Which
Affect Women—Public
Images, Stereotypes
*Grand Ballroom*

***Cochairs:***
Mi Ja Kim, Ph.D.
Professor and Dean
College of Nursing
University of Illinois at Chicago

Carolyn B. Robinowitz, M.D.
Senior Deputy Medical Director
American Psychiatric Association

*Participants:*
Rina Alcalay, Ph.D.
Assistant Professor of Rhetoric
and Communication
University of California, Davis

Frances J. Dunston, M.D., M.P.H.
State Commissioner of Health
New Jersey State Department of Health

Shiriki Kumanyika, Ph.D., R.D., M.P.H.
Associate Professor and Associate Director
for Epidemiology
Center for Biostatistics and Epidemiology
Pennsylvania State College of Medicine

Margaret A. Nosek, Ph.D.
Assistant Professor
Department of Physical Medicine
and Rehabilitation
Baylor College of Medicine

Linda G. Phillips, M.D.
Associate Professor
Division of Plastic Surgery
University of Texas Medical Branch (Galveston)

Tenure and Promotion
*Congressional Ballroom*

*Cochairs:*
Janet Bickel
Assistant Vice President for Women's Programs
American Association of Medical Colleges

Deborah Powell, M.D.
Professor and Chairman
Department of Pathology
University of Kentucky

*Participants:*
Henry W. Foster, Jr., M.D.
Dean
School of Medicine
Vice President for Health Affairs
Meharry Medical College

Sheryle J. Gallant, Ph.D.
Associate Professor of Psychology
Department of Medical Psychology
Uniformed Services University of the
Health Sciences

Kathryn A. McCarthy, Ph.D.
Professor of Physics
Tufts University

Frank G. Standaert, M.D.
Director of Research
Toledo Hospital

Understanding Power
*Congressional Ballroom*

***Cochairs:***
Hazel J. Harper, D.D.S., M.P.H.
President
Robert T. Freeman Dental Society
Spokesperson
National Dental Association

Carol Nadelson, M.D.
Professor and Vice-Chairman
Department of Psychiatry
New England Medical Center Hospitals

***Participants:***
Tenley E. Albright, M.D.
Chairman
Institute for Clinical Applications

Hannah V. Carey, Ph.D.
Assistant Professor
Department of Comparative Biosciences
University of Wisconsin School of Veterinary Medicine

Beverly D. Rowley, Ph.D.
Director of Medical Education
Maricopa Medical Center

Harassment in the Workplace
*Annapolis Room*

***Cochairs:***
Rebecca Dresser, M.S., J.D.
Professor of Law and Biomedical Ethics
Case Western Reserve University School of Law

Lois Margaret Nora, M.D., J.D.
Assistant Dean
Rush Medical College

***Participants:***
Judy Norsigian
Co-Director
Boston Women's Health Book Collective

Rene F. Rodriguez, M.D.
President
National Confederation of Hispanic American Medical Associations

Janet L. Walker, M.D.
Vice President
Ruth Jackson Orthopaedic Society
Assistant Professor
Division of Orthopaedic Society
University of Kentucky
Orthopaedic Surgeon
Shriner's Hospital for Crippled Children

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| 7:00 pm-10:00 pm | **Creative Dinner Discussion Groups** | |
| | Networking for Graduate Women in Science<br>*Democracy Room* | ***Facilitators:***<br>Theresa Gamble<br>Graduate Student, Biophysics<br>University of California at San Francisco<br><br>M.R.C. Greenwood, Ph.D.<br>Dean of Graduate Studies<br>Professor of Nutrition and Internal Medicine<br>University of California, Davis<br><br>Caroline Reich<br>M.D., Ph.D. Candidate<br>Emory University |
| | The Politics Mother Never Taught You<br>*Grand Ballroom* | ***Facilitators:***<br>Bonnie R. Kalberer<br>Assistant Director<br>Office of Science Policy and Legislation<br>Office of the Director<br>National Institutes of Health<br><br>Barbara McLaughlin, Ph.D.<br>Professor of Ophthalmology and Visual Sciences<br>Professor of Anatomical Sciences and Neurobiology<br>University of Louisville School of Medicine<br><br>Lydia Villa-Komaroff, Ph.D.<br>Associate Professor<br>Department of Neuroscience<br>Harvard Medical School |
| | Why Not a Women's Health Specialty?<br>*Congressional Ballroom* | ***Facilitators:***<br>Susan Blumenthal, M.D., M.P.A.<br>Chief<br>Behavioral Medicine Program<br>National Institute of Mental Health<br>Alcohol, Drug Abuse, and Mental Health Administration<br><br>Anne Colston Wentz, M.D.<br>Professor, Obstetrics and Gynecology<br>Northwestern University Medical School<br><br>Susan Wise<br>Program Analyst<br>National Institute of Dental Research<br>National Institutes of Health |

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|---|---|
| But We've Always Done It Like This: Challenging the Current Structure<br>*Grand Ballroom* | ***Facilitators:***<br>Carola Eisenberg, M.D.<br>Director<br>International Programs for Medical Schools<br>The Harvard Medical School<br><br>Deborah M. Smith, M.D., M.P.H.<br>Vice Chairman<br>Department of Obstetrics and Gynecology<br>Howard University Hospital<br><br>Donald E. Wilson, M.D.<br>Dean<br>University of Maryland School of Medicine |
| Science As a Second Language: Ethnic Issues<br>*Montgomery Room* | Facilitators:<br>Dyanne Affonso, Ph.D., R.N.<br>Professor<br>Department of Family Health Care Nursing<br>University of California at San Francisco<br><br>Thomas E. Malone, Ph.D.<br>Vice President for Biomedical Research<br>Association of American Medical Colleges<br><br>Ciro V. Sumaya, M.D., M.P.H.T.M.<br>Associate Dean for Affiliated Programs and Continuing Medical Education<br>University of Texas Health Science Center at San Antonio |
| Women, Research Thyselves: Women Researching Women's Health Issues<br>*Grand Ballroom* | ***Facilitators:***<br>Lynn H. Gerber, M.D.<br>Chief<br>Rehabilitation Medicine Department<br>Clinical Center<br>National Institutes of Health<br><br>Gerald L. Hill, M.D.<br>Director<br>Center of American Indian and Minority Health<br><br>Iris J. Schneider<br>Assistant Director<br>Program Operations and Planning<br>National Cancer Institute<br>National Institutes of Health |

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|---|---|
| Building Support Structures—<br>Keeping Your Sanity<br>*Congressional Ballroom* | ***Facilitators:***<br>Linda L. Alexander, Ph.D.<br>Department of Health Education<br>University of Maryland at College Park<br><br>Sharlene M. Weiss, Ph.D., R.N.<br>Chief<br>Health Promotion/Disease Prevention Branch<br>National Center for Nursing Research<br>National Institutes of Health<br><br>Patricia Whitley-Williams, M.D.<br>Associate Professor<br>Clinical Pediatrics<br>Morehouse School of Medicine |
| The "Old Boys Network"—<br>Not for Old Boys Only<br>*Congressional Ballroom* | ***Facilitators:***<br>Donnica L. Moore, M.D.<br>Associate Director<br>Sandoz Pharmaceuticals<br><br>Anne P. Sassaman, Ph.D.<br>Director<br>Division of Extramural Research and Training<br>National Institute of Environmental Health Sciences<br><br>Marcelle Willock, M.D.<br>Professor and Chair<br>Department of Anesthesiology<br>Boston University School of Medicine |

**Friday, June 12, 1992**

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| 7:00 am-2:00 pm | **Registration**<br>*Congressional Ballroom Foyer* |
| 7:30 am-9:15 am | **Continental Breakfast Featuring An Exhibition of Innovations: Poster/Information Session**<br>*Grand Ballroom*<br><br>**Plenary Session**<br>*Congressional Ballroom* |
| 9:30 am | **Creative Dinner Discussion Group Reports** |
| 10:45 am | **Break** |

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| 11:00 am | **Strategy Development Session Reports**<br>• Education<br>• Undergraduate, Doctoral, and Health Professional Degrees<br>• Reentry and Workplace Climate<br>• Tenure, Harassment, and Power | |
| | **Luncheon Program**<br>*Grand Ballroom* | |
| 12:30 pm-1:45 pm | **Luncheon Address**<br>**"Girls, Science, and the Schools: What Is Happening, What Needs To Happen"** | Susan McGee Bailey, Ph.D.<br>Director<br>Wellesley College Center for Research on Women |
| 1:45 pm | **Remarks** | Antonia C. Novello, M.D.<br>Surgeon General<br>Public Health Service |
| 2:00 pm | **Open Microphone Session—Recommended Innovations From Workshop Attendees** | |
| 3:00 pm | **Closing Remarks** | |

Resource Center

APPENDIX 4

# Public Hearing Summary

Resource Center

## Table of Contents

Foreword ..... 187
Introduction ..... 189
Issue 1: Recruiting Women to Biomedical Careers ..... 191
Issue 2: Visibility: Role Models and Mentors ..... 194
Issue 3: Career Paths/Rewards ..... 196
Issue 4: Reentry Into a Biomedical Career ..... 199
Issue 5: Family Responsibilities ..... 200
Issue 6: Sex Discrimination and Sexual Harassment ..... 202
Issue 7: Research Initiatives on Women's Health ..... 204
Issue 8: Gender Sensitivity ..... 205
Issue 9: Minority Women in Science ..... 206
Participants ..... 209

Resource Center

# FOREWORD

The Office of Research on Women's Health was established within the Office of the Director of the National Institutes of Health in September 1990. It was charged with the critical objectives of *giving a central NIH focus to women's health issues and of establishing a science base that will yield reliable diagnoses, effective treatment, and prevention strategies for women.*

Recognizing the actual and potential contribution of women to the advancement of scientific knowledge is a priority for the Office of Research on Women's Health. In addition, we are concerned about (1) providing motivation for the recruitment of women into biomedical careers, (2) the retention of women who have already chosen research careers by assisting them to progress and advance, and (3) the reentry into the profession by many women who have dropped out of research for a variety of reasons, including the difficulties they faced in combining a research career with their many other roles and responsibilities in life.

The prominence that is currently being afforded women's health issues will, almost certainly, begin to fade unless we can bring about a "critical mass" of women at work in biomedical research. We are convinced that the best means of assuring that research related to women's health remains a visible and active priority as we enter the 21st century is to increase the number of women in policy-making positions in research institutions—including universities, the Federal Government, and the private sector.

It would be naive to suggest that *all* we need to do to remedy the shortcomings in research on women's health is to enlist more women into biomedical research. However, many *are* convinced that there is a direct relationship between the amount—and quality—of research being conducted on women's health issues and the number of women engaged in this research.

We are also concerned about mentors, inspirational support, and opportunities for both traditional and nontraditional pathways for women to be successful in research careers. Our concern extends to the participation of women of all racial and ethnic origins in these endeavors.

We recognize that the attrition rate is alarming for women who enter educational and career paths in science. Even in branches of science where women are well represented at the undergraduate level, their numbers decline at the graduate level, and similar data exist for career progression.

What can be done to bring more women into biomedical research and improve their opportunities for advancement? How can we rectify the loss of women from science education and careers? The Office of Research on Women's Health is looking to the scientific and educational communities to (a) provide us with insight into the major barriers which women face and (b) formulate innovative strategies to overcome those barriers. We seek guidance in how to convince the research establishment of the benefits of having more women participating in research. We plan to address such related issues as tenure, child care and family care, nontraditional pathways to advanced education and careers, problems in the workplace, and new professional options. Our purpose is to define the necessary "dynamics of change," the solutions and modifications that will alleviate the underrepresentation of women in scientific professions, and enhance the opportunities for them to assume leadership roles in biomedical careers as we enter the 21st century.

We appreciate the participation of all who have contributed to this process. Your participation affirms that the role of women in biomedical science careers is a deserving priority.

Vivian W. Pinn, M.D.
Director
Office of Research on Women's Health
National Institutes of Health

## INTRODUCTION

A public hearing was held on March 2 and 3, 1992, on the topic of "Recruitment, Retention, Reentry, and Advancement of Women in Biomedical Careers." The hearing was sponsored by the Office of Research on Women's Health (ORWH) and invitations to persons and organizations interested in presenting or submitting testimony were published to the public according to Government protocol.

The purpose of the hearing was to develop information for planning and conducting a specific activity related to ORWH's threefold mandate. The mandate of the Office of Research on Women's Health, established in September 1990 within the Office of the Director of the National Institutes of Health (NIH), is the following:

1) to strengthen and enhance research related to diseases, disorders, and conditions that affect women and to ensure that research conducted and supported by NIH adequately addresses issues regarding women's health,[1]

2) to ensure that women are appropriately represented in biomedical and biobehavioral research studies supported by the NIH, and

3) to develop opportunities to increase the participation and advancement of women in biomedical careers.

The activity, a workshop entitled "Women in Biomedical Careers: Dynamics of Change, Strategies for the 21st Century," was held June 11-12, 1992, in Bethesda, Maryland. The objectives of the workshop are to:

- Generate solid and innovative recommendations for actions.
- Develop strategies for enhancing career achievements.
- Highlight success stories and programs that work for women.
- Provide pathways for networking and collaboration.

Recently, efforts to attract women to graduate programs and careers in science have yielded positive results, as indicated by their increased enrollment in medical schools and doctoral programs. Yet, women continue to be underrepresented in a broad range of scientific professions, especially in leadership positions.

By sponsoring the public hearing and workshop on women in biomedical careers, the ORWH sought to identify barriers and obtain a slate of recommendations for action. In addition to guiding the June workshop, these recommendations enabled the ORWH and other agencies and organizations to foster efforts to maximize involvement of women in science.

At the hearing, 43 individuals and organizations presented testimony, and an additional 27 submitted written testimony. This document is a summary of the major issues that emerged during the hearing. Most testimonies described multiple barriers for women pursuing biomedical careers and presented several recommendations for overcoming each barrier. Those hundreds of recommendations tended to group into nine issue areas; thus, this summary is organized according to those nine issues.

*For each issue area, the summary presents a synthesis of the relevant barriers, followed by a section highlighting the relevant recommendations. In some instances, the barriers and recommendations are paraphrased or stated almost verbatim; in other instances a synthesis statement encompasses several similar recommendations, or expands them to be more comprehensive in their application to biomedical careers. For statements in which data are presented, a reference number is printed in brackets [ ]. The numbers refer to the numbers of testimony as identified at the end of this summary. An attempt was made to state each recommendation only once in the summary.*

Resource Center

## Issues and Recommendations

### Issue 1: Recruiting Women to Biomedical Careers

*Barriers*

Although women now constitute the majority of college students, in recent years fewer women students have been enrolling as science majors. Two factors that contribute to this lack of pursuit of science (and math) by women are:

- Discouragement of girls to study science in early grade levels (sex-role stereotyping).
- Failure of career counseling to direct women to the sciences.

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***"Girls and women still see science as for 'White Males Only.'"{40}***

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The critical period for encouraging students to enter the sciences is *before* high school. Yet, at each stage in early schooling, girls are culturally and attitudinally discouraged from participating in the physical sciences and mathematics, as is evident from the following facts:

- During grade school, girls are more cognizant of science than boys, but by the time the students reach secondary school, this difference reverses.
- Gender gaps in science show up as early as age 9, and double by age 13. {26}
- During secondary school, girls are not as likely as boys to be encouraged to take math and science courses.
- Beginning in middle and junior high school, girls exhibit more negative attitudes, pursue fewer opportunities, and by the end of high school score considerably lower than boys on measures of mathematics and science achievement, as evidenced by National Assessment of Educational Progress and Scholastic Aptitude Test scores.
- Sex-role stereotyping appears to most seriously affect minority girls, even those who are high achievers.

As a consequence of the lack of exposure and interest, young women are discouraged from pursuing college degrees in science.

Even when young women demonstrate interest and aptitude for science, they are not likely to be directed to a biomedical career by career counselors.

- A questionnaire revealed that students interested in science in high school were discouraged from pursuing a career in science by parents or educators. {48}
- Women are not encouraged in their training to consider *research* careers. Women entering science are often pointed toward and recruited into clinical, administrative, and other direct service roles regardless of demonstrated interest in or aptitude for conducting empirical research.
- Many women, especially ethnic minority women, have difficulty perceiving the advantages and rewards of a research career. Women with specific scientific training continue to be rewarded for their emotional and "people oriented" skills instead of their analytic abilities.

***Issue 1 Recommendations***

Early in primary and secondary education young women are both consciously and unconsciously discouraged from pursuing careers in science and math. This, in part, is due to teaching styles that are not sensitive to gender-based differential attitudes regarding capability. Any intervention

strategies must increase *both* motivation of students as well as their performance levels, if results in student achievement are going to be effective and long-term. Areas which should be addressed include:

- Teacher education, both preservice and in-service.
- Early childhood education.
- Textbooks and instructional material.
- Alternative methods of testing and evaluation.
- Issues of gender stereotyping, teachers' expectations, and students' self-esteem.
- Academic course and career counseling.
- Parent education.

More specifically, schools can help negate the myth that girls have no aptitude for science and math by:

- Fostering teacher and student awareness of equity issues.
- Creating a climate in which both girls and boys learn mathematical, scientific, and technical skills effectively.
- Allocating adequate teaching time to the skill areas in which each gender has the most difficulty.
- Providing concrete examples of the usefulness of these skills in future career choices.

The American Association of University Women (AAUW) has recently published a document entitled *How Schools Shortchange Girls* that highlights the need for equity workshops for teachers to help them recognize and address the teaching styles that negatively affect expectations and aspirations of girls and young women. NIH should:

- Join with the AAUW and other organizations in publicizing the results of the studies that form the basis of this document.
- Identify and eradicate the ways in which comparable behaviors are perpetuated in educational institutions receiving NIH training grants.

Aggressive programs are needed to direct women into biomedical careers, for example:

- Funding for early identification and motivation programs. Middle schools especially require these types of programs because it is at this level that students begin to consider career goals.
- Local health-career high schools or tracks to bring potential students into science and clinical sites to learn skills and to meet successful women scientists.
- More summer programs that allow women high school and undergraduate students to serve as interns in scientific laboratories.
- Mentoring programs in magnet high schools to influence the scientific preparation of women. Such programs would link high school science teachers and students with universities and thereby increase the scientific knowledge and interest of students while improving the quality of high school science programs and teachers.
- Professional linkages between young women in high school and biomedical researchers.
- Summer internships, laboratory tours, seminars, and other programs geared to the high school students, to develop contacts that give a realistic view of research to the students.
- Increased attention and concomitant Federal funding for extramural experiences for undergraduate women students. Participation in these projects, through internships or other work opportunities, would offer students another route to developing an interest in science and would provide contact with adult role models and mentors.

- Financial support to allow postbaccalaureate women to study full-time and finish their courses more quickly.
- Career counseling to expand women's career goals into all areas of biomedical sciences by exposing them through panel discussions and workshops to other women who have made a variety of career choices.
- Research support to allow interested students to work in research laboratories where they become acquainted with hands-on science, have access to mentoring on a one-on-one basis with a research scientist, and receive intellectual and moral support from a network of other students and personnel working in the laboratory.
- Intellectual support through availability of tutors and faculty to aid their progress.
- Intervention workshops for women that focus on such topics as careers in science and how to combine personal and professional lives, among others.

Recruitment efforts of women also should become more aggressive.

- Departmental chairpersons should designate faculty members to coordinate the department's efforts to recruit undergraduate, graduate, and postgraduate students into research careers.
- Administrators of M.D. and Ph.D. programs should identify talented women undergraduates and medical students and actively recruit them.

## Issue 2:
## Visibility: Role Models and Mentors

### *Barriers*

The lack of female role models is a serious barrier to women during all career phases in science: recruitment, retention, reentry, and advancement. The need to make women in science more visible applies to the general public as well as to specific career aspirants. Seeing a predominance of men in high-ranking positions in the biomedical profession subtly reinforces the image that women do not belong in science. If women do not see women successfully balancing career and family responsibilities, they become less able to imagine themselves managing these feats. After a lifetime of negative conditioning, women need the positive one-on-one interactions that mentoring provides in order to remain and advance in science fields.

***"In the 31 science courses I took during my undergraduate studies at the University of Washington, I had two female science professors—both in biology. In medical school, I had five or so female lecturers—but only two full-time professors—out of a faculty of over 100. The opportunity for female professors to serve as role models for the next generation of women is lost for lack of academic appointments."***
***—Medical Student***

In high school math and science classes, young women describe cultural and sociological barriers and, by graduate school, they report that they often *feel isolated.* There are relatively few women professors, and women students believe that they do not receive the same attention from men teachers as do men students. This is particularly true regarding foreign-born faculty, whose attitudes toward women may be even less egalitarian than that of U.S. men.

In fact, there are few role models for women because of the paucity of women in biomedical career positions, especially in senior faculty and research positions. The table below describes the gap.

**Medical Gender Gap – 1990**

| | Men | Women |
|---|---|---|
| Medical School Deans | 100% | 0% |
| Physicians | 84% | 16% |
| Medical School Faculty | 79% | 21% |
| Medical School Students | 64% | 36% |
| Nurses | 3% | 97% |

Source: The Feminist Majority Foundation, Washington, DC {62}

A lack of role models implies a lack of mentors, women who can personally guide and encourage other women in their careers. Mentors form a fundamental rung in the career ladder of medicine. Senior professionals give their junior colleagues attention and feedback, and are a resource for advancement, graduate opportunities, funding projects, and credential support. Without mentoring, women are handicapped in obtaining research grants, publication opportunities, tenure-track positions, and other research and clinical opportunities.

In a 1989 survey of female medical students, 94 percent reported that they need a mentor, 61 percent had a mentor, but only 11 percent have a female mentor. {1} A survey of the Ruth Jackson Orthopaedic Society reports that only 53 percent of respondents had a mentor, of which only 16 percent were women. {13}

### *Issue 2 Recommendations*

A majority of persons and organizations at the hearing made recommendations for increasing the visibility of women in biomedical careers:

- Encourage women in biomedical careers to *find* mentors and network among organizations.
- Encourage men faculty members to be open to mentoring women students.
- Develop and support mentoring programs at the undergraduate and graduate levels.
- Develop faculty reward systems for 1:1 or 1:2 mentoring of graduate student researchers in the biomedical sciences.
- Develop and publicize a model mentoring program.
- Continue and increase the emphasis on mentoring interested women undergraduate science students and provide the personal contacts into research laboratories to further develop research interests.
- Invite campus scientists to meet informally with women undergraduates.
- Develop symposia on career development that would include discussions on marital choice, children, and family life and their impact on research careers.
- Develop a mechanism for measuring the success of mentoring programs and invest money to make the successful programs more widely available.
- Examine attitudes of women physicians towards their peers. Actively develop women role models in academic medicine and in private practice to help women entering medicine emulate a model different from, but as valid as, the male-dominated tradition of medicine.
- Recruit women researchers into positions where they will be visible and accessible to women in biomedical training.
- Involve women in school curricula, where they can serve as role models for students.
- Showcase the achievements of medical and scientific women, especially women of color, through speakers' bureaus and other publicized efforts aimed at high school, college, and professional audiences.
- Educate chairpersons and training directors about the importance of role models for the career development of all future academics, including women.
- Provide opportunities for networking among women faculty on a national basis to allow them adequate access to role models and mentors.
- Develop programs for the grade-school level that present both women and men as role models in sciences as well as programs that encourage participation in science through events such as science fairs.

The following recommendations were specifically addressed to NIH:

- Develop mentoring programs and make them available to all principal investigators, covering such issues as how to be a more effective mentor and how to avoid subtle gender bias.
- Improve visibility of women in biomedical research, fund meetings on the subject, support a visiting women lecture series, and increase the number of women on NIH panels.
- Adopt mechanisms for increasing the visibility of women researchers in order to counteract the view widely held not only by girls and young women, but also by their parents, siblings, peers, teachers, and counselors, that scientific research is largely, and properly, a white male endeavor.
- Identify the ways in which NIH, through publications and policies, reinforces the above attitude.
- Provide career guidance to women about the types of assignments and experiences they need for entry into the Senior Executive Service.

## Issue 3:
## Career Paths/Rewards

*Barriers*

Career paths in the biomedical sciences often do not offer women the same opportunities and rewards they offer men. The statistics verify salary discrepancies between men and women, and the existence of the "glass ceiling." The "Old Boy Network" is still strong, often in the form of male bonding. Women in biomedical careers may have unequal access to appointments, promotion, and tenure, despite their credentials, numbers, or seniority.

***"Our rule of thumb is 'I have to be twice as smart and work three times as hard to get three-fourths the pay and one-half the credit.'" {2}***

Biomedical careers are structured like other fields nationally—with a glass ceiling:

- Only 2 percent of the Fortune 500's top executives are women.
- Only three women are in the position of full dean of a medical school.

**Distribution of U.S. Medical School Faculty by Sex, Rank and Tenure Status**

| | Professor | | Associate Professor | | Assistant Professor | | Instructor | |
|---|---|---|---|---|---|---|---|---|
| **Tenure Status** | **Male** | **Female** | **Male** | **Female** | **Male** | **Female** | **Male** | **Female** |
| **Tenured** | 12,137 | 1,002 | 5,500 | 1,101 | 459 | 184 | 10 | 10 |
| **On Tenure Track** | 620 | 72 | 1,974 | 428 | 6,255 | 2,199 | 433 | 316 |
| **Not on Tenure Track** | 2,251 | 233 | 4,049 | 1,032 | 7,283 | 3,292 | 1,985 | 1,436 |
| **Tenure N/A-Clinical Faculty** | 220 | 11 | 245 | 31 | 525 | 138 | 134 | 42 |
| **Tenure N/A at Institution** | 660 | 32 | 570 | 77 | 883 | 259 | 278 | 115 |
| **Missing** | 497 | 36 | 722 | 123 | 2,347 | 979 | 601 | 419 |
| **TOTAL** | **16,385** | **1,386** | **13,060** | **2,792** | **17,752** | **7,051** | **3,441** | **2,338** |

Source: Association of American Medical Colleges (AAMC), *U.S. Medical School Faculty 1991*, Faculty Roster System, Washington, DC:AAMC, 1991.

**Distribution of Physician Faculty of Departments of Pathology by Gender and Academic Rank—1989**

| Rank | No. of Men (%) | No. of Women (%) | Total (%) |
|---|---|---|---|
| Professor | 910 (42.6) | 76 (14.3) | 986 (36.9) |
| Associate Professor | 551 (25.8) | 148 (27.9) | 699 (26.2) |
| Assistant Professor | 612 (28.6) | 267 (50.3) | 879 (32.9) |
| Instructor | 57 (2.7) | 37 (7.0) | 94 (3.5) |
| Other and Missing | 8 (0.3) | 3 (0.6) | 11 (0.4) |
| Total | 2,138 | 531 | 2,669 |

Source: *U.S. Medical School Faculty: "The Numbers Book"* 1989. Faculty Roster System, Association of American Medical Colleges, as presented in R.E. Anderson et al., *Human Pathology* 22(9):894. {41}

The two tables above show data on the distribution of medical school faculty. The first table is 1991 data for all departments; the second is 1989 data for departments of pathology.

Furthermore, the career path for women not only may lead to a dead end but also may be more arduous.

- Men achieve the rank of full professor in 12 years, whereas women labor 20 years to get there. {1}
- Men are four times as likely to achieve full professor rank. {24}

Salary differences exist between men and women scientists.

- In 1986 women scientists earned about 78 percent of salaries earned by men. The lowest salaries were earned by women in the life and social sciences, 71 percent and 72 percent, respectively, of the salaries of men employed in those fields. {26}
- At the doctoral level in 1987, overall women earned 79 percent of the salaries of men. {26}
- Entry-level salaries appear to be equal, but the disparity in salaries begins around age 30, when men begin to earn more than women. {26}

Nursing scientists have been disproportionately affected by gender-driven stereotyping in their attempts to advance. A common perception is that nurses are not scientists and do not perform studies of scientific merit. Committees have difficulty evaluating proposed studies within the context of the nursing profession.

***Issue 3 Recommendations***

Participants in the hearing made the following recommendations.

- Collect data on the career paths of graduates from medical programs.
- Develop a tracking system for the career paths of NIH intramural and extramural scientists (men and women) that monitors promotions.
- Offer incentives, such as equipment or support-staff salaries, to universities or departments hiring and promoting women faculty at levels equal to or better than those represented in the pool. It is important to recognize the generational issues involved in funded research today. Many senior faculty, who are predominantly men, came to their positions in a time of generous funding and allocations. It is more difficult today to secure research funding, just at the time that women are making significant inroads into the scientific establishment.
- Offer workshops for departmental chairs to address the issues of (1) how to promote the careers of young faculty, with an emphasis on problems faced by women, and (2) career skills such as writing papers and grant proposals.
- Develop a registry and referral service to better inform research trainees of appropriate employment opportunities and to assist schools and advanced education programs seeking qualified women and minority investigators.
- Investigate, rescind, and/or revise nepotism restrictions and salary limitations in a manner that improves job opportunities for women scientists whose spouses are employed at the same institution. An increasing number of married couples have dual professional careers.
- Acknowledge women without advanced degrees who contribute to successful scientific research.
- Increase the number of women in influential policy positions.
- Increase the number of women in allied health professions on Federal grant review committees.
- Assist women who have entered biomedical careers to advance to leadership positions.
- Conduct a cross-sectional survey of women scientists of all academic ranks, and of those who have left the profession, in order to identify the circumstances that promote or impede the success of women.
- Expand or develop leadership forums and opportunities for women scientists; establish regional forums not only to share information but also to allow women scientists to receive training in leadership skills, business issues, and other areas that will help them develop confidence in skills outside their areas of expertise.

***"The success of our collective efforts to increase the opportunities and improve access to graduate study and to entry-level research positions in the biomedical sciences will be amplified when there are more women in a position to influence health care and research policy." {7}***

- Offer opportunities to participate in special programs that develop leadership skills, for example: leadership training, communications skills, personnel management, assertiveness training, stress reduction, wellness promotion, time management, and interpersonal relations.
- Offer workshops for professional women specifically aimed at how to effectively use the power of their positions.
- Ensure that female scientists have access to structured professional experiences designed to enhance self-confidence and build independence. This can include opportunities to present and defend research results, evaluate and criticize the research of others, participate in laboratory discussions and decisions, and plan and implement research plans of increasing sophistication.
- Provide a hands-on research experience as part of medical school curricula.
- Provide opportunities, for residents who wish to have more extensive research training, to elect a research rotation (up to 6 months) or a supervised longitudinal research project integrated into the residency.
- Create linkages with clinical care settings, community-based organizations, and other direct-service providers. As many women, including minority women with interest in research, have opted for direct service and training careers, academic institutions can tap the skills of these individuals by creating collaborative working relationships with these organizations as sources of research subjects and of clinical expertise with special populations.

Specially Funded Programs

- Generate adequate funding for programs that will assure availability of "bridge" research funding to newly trained women beginning their academic careers. These funds would support continued research activity between the training period and the time when new researchers become capable of successful competitive grant funding.
- Make available to women research assistantships and summer research fellowships through foundations, Federal agencies, and medical schools.
- Expand short-term research training grants for pre-doctoral students that afford students research opportunities under faculty preceptorship while they are still in the pre-doctoral program.
- Offer senior fellowships to established women scientists, perhaps made available through a cost-sharing arrangement with participating institutions.
- Design research fellowships to be more flexible; for example, allow for part-time research training.
- Require that institutions demonstrate adequate recruitment and mentoring of women in order to qualify for funding of training programs.
- Establish and fund programs designed to increase research activities by women. These programs could be modeled on NIH's Minority Access to Research Careers (MARC) and Minority Biomedical Research Support (MBRS) Programs, and on the National Institute of Mental Health (NIMH)-funded American Psychiatric Association (APA) Program for Minority Research Training in Psychiatry and the Minority Supplement Awards, which provide support for minorities pursuing research training and extra funding to investigators who include a minority co-investigator on their projects.

## Issue 4:
## Reentry Into a Biomedical Career

*Barriers*

Many women wish to reenter biomedical training to continue a career in research or teaching after they have been inactive in the field. These women may have left their careers in order to have and raise a family or because of financial or geographical reasons. Reentry may seem to pose overwhelming obstacles and deter women from doing so.

*Issue 4 Recommendations*

Programs and funding were recommended for women who wish to retrain or reenter biomedical careers.

- Make available postdoctoral fellowships for women to retrain or reenter a field.
- Redesign eligibility rules for fellowships and positions to allow flexibility for accommodating gaps in career activity, for example, regarding the maximum number of years since receiving the Ph.D. or M.D. degree or the number of publications in the prior 5 years.
- Exclude maternity or child-rearing leave from the time limit for tenure decisions.
- Award reentry fellowships with no stipulation about what school the awardee must attend, thereby allowing women to remain in their homes.
- Offer programs for returning female students whose undergraduate work was not in the sciences, or whose degrees were completed some years ago, who wish to enter research and technical careers. Similar programs already exist for students who wish to pursue a medical degree but who lack the appropriate undergraduate science and mathematics training. Similar programs could be established for those students interested in research-oriented areas.
- Redesign curriculum requirements for individuals taking nontraditional career paths. For example, amend grants to allow time off for child rearing.

## Issue 5:
## Family Responsibilities

### *Barriers*

In 1990, women comprised 57.8 percent of the U.S. work force, and 68 percent had children under age 18. If these statistics hold true for women in biomedical careers, one might assume that about two-thirds of the women in biomedical careers have dependents. Unfortunately, the biomedical structure not only fails to accommodate the pregnancy and parenting responsibilities of women, but also unduly penalizes those professional women who choose to have families. Women professionals who wish to bear a child may face disadvantages in planning their career opportunities, and in how they are evaluated for career advancement once they have the child. Women who take time out for pregnancy and child rearing can lose valuable benefits, forfeit their position on the tenure track, or be harshly judged by medical leaders over the timing and direction of their career path.

Recent surveys indicate the following:

- Nearly 50 percent of all U.S. medical programs still have no written maternity leave policy. {31}
- Only 37.5 percent of medical schools have formal maternity leaves. {1}
- 50 percent of all teaching hospitals have no child-care facilities for physicians or staff. {31}
- Only 17 percent of community hospitals offer child-care services. {59}
- Only 18 percent of medical schools provide child care. {18}

Even when institutions have maternity leave policies, they typically do not resolve scheduling issues posed by dependent care needs.

- Only 14 percent of residency programs offer part-time or shared residency positions. {59}
- Only 5.5 percent of medical schools have job sharing. {1}

***"I wouldn't mind so much the career slowdown that has come with being a mother if that were factored into the mental timetable superiors use when deciding on promotions. A mother's 30-hour week, 10-year career should be compared to a childless scientist's 60-hour week, 5-year rather than 10-year record." {39}***

In an academic career, the time to track tenure and the pressure to be productive occur early and tend to coincide with prime childbearing years for women. This factor impedes women's progress into the higher ranks of academic medicine. Women physicians adapt to the needs of the institutions when, instead, the institutions should focus on and provide assistance to the special needs of women physicians.

Thus, balancing family and career is one of the most serious problems facing women who choose biomedical careers. This problem is the most difficult to address because it calls into question both the traditional roles of women in society and the unstated expectations of what it means to be a scientist. The expectation is that in order to be a good scientist, one must be completely devoted to one's work, and in order to be a good mother and partner, one must be completely devoted to one's family.

### *Issue 5 Recommendations*

A majority of persons and organizations giving testimony recommended changes in institutional approaches to assessing career progress and accommodating dependent-care needs. One organization pointed out that even these measures are not enough if women who take advantage of them are considered "second-rate scientists"

who lack dedication. The following recommendations were made.

- The biomedical community should encourage a new definition of "successful career" paths, so that women who have taken time for family responsibilities are not viewed as less committed to their profession, or penalized in their advancement opportunities.

Family Leave

- Distinguish between maternity leave and parental leave and provide for both.
- Formulate formal maternity leave policies for all institutions.
- Formulate maternal leave policies that offer a minimum of 12 weeks of family leave.
- Develop work policies that recognize that women still have the major part of child-rearing responsibilities in families. Existing child-care reform and family medical leave packages passed by Congress could serve as models for what is needed.
- Promote universal acceptance of the need for equitable family leave policies and child-care assistance.

Work Schedules

- Promote the acceptance of and institutionalize flexible-time, part-time positions, and job-sharing opportunities.
- Establish a national clearinghouse of information on such positions in biomedicine.
- Acknowledge the unique needs of women during their undergraduate and graduate medical training, and provide a more flexible schedule and variable graduation dates.

Child Care

- Provide child-care facilities at undergraduate, graduate, and postdoctoral institutions.
- Provide child care to women employees at all institutions.
- Provide child-care facilities at convention centers during professional organizational meetings.
- Consider providing stipends for dependent-care during training programs.

Tenure Track

- Explore ways to extend or slow the "tenure clock" for those who need to temporarily take time out from their careers for family purposes.
- Develop policies in all institutions to allow delays of the tenure clock to accommodate women with family responsibilities.
- Shift the emphasis placed on publication record from quantity to quality by limiting the number of publications that may be included in applications for promotion or tenure.
- Develop attractive benefits packages in the public and private sectors to include:
  - — Health insurance and disability coverage (including pregnancy).
  - — On-site child care.
  - — Maternity leave.
  - — Set aside funds (grants) structured for researchers in peak child-rearing age.
  - — Flexible schedules.
  - — Liberal leave to take care of sick children or sick parents.
  - — "Work-at-home" assignments.
  - — Loan forgiveness programs.
  - — Retirement programs.
  - — Funding mechanisms for children's college education.

## Issue 6:
## Sex Discrimination and Sexual Harassment

### *Barriers*

For discussion purposes, a distinction is made between sex discrimination and sexual harassment. The former is the exclusion of women from opportunities or unfair assessment of their work because they are women. The latter, sexual harassment, comprises sexual advances in speech or actions. Sex discrimination and sexual harassment both have the same negative impacts on women, society, and the biomedical professions. These impacts were characterized at the hearing as personal, professional, and scientific.

- *Personal:* The victim's health is affected and the following may result: depression, anxiety disorders, post-traumatic stress disorder, psychosomatic illness, gastrointestinal distress, immune suppression, and exacerbated underlying medical conditions. Once such symptoms are present, they are often used by the harassers as "evidence" that the woman deserved the harassment or that she caused it.
- *Professional:* Science is needlessly impeded by the intentional suppression of the contributions of women scientists by harassers who intentionally bar their victims from completing their scientific work or from gaining recognition for their work.
- *Scientific:* Who conducts the science affects which questions are considered important and affects how the scientific resources are allocated. It affects which questions are asked and how the questions are framed, which data are collected and how the data are analyzed, as well as how the results are interpreted and applied. Diversity is good for science. It brings a variety of perspectives to bear on solving problems and helps to ensure that the needs of all populations will more likely be recognized and met.

There have been various reports of discrimination and harassment. In a survey by the Orthopaedic Society of its members, 39 percent of respondents reported sex discrimination during medical school, 22 percent sexual harassment, 65 percent reported discrimination during residency, and 46 percent harassment. {13} A 1989 survey in Massachusetts revealed that 54 percent of female physicians and medical students had experienced sex discrimination and 27 percent harassment in a one-year period. {31}

Last summer, *Time* magazine reported that women medical students at Stanford University complained of unwanted sexual advances by professors and peers; one student indicated that her breasts had been fondled. {24} In May 1991, the issue received public attention when Frances Conley, neurosurgeon and Stanford professor, resigned for reasons of sexual harassment and the proposed promotion of the fellow surgeon who she felt was treating her in a sexist manner.

Other cited forms of discrimination that undermine morale and productivity are the following.

- Competent, hard-working, and intelligent women are unfairly characterized as being unfeminine and undesirable.
- Women who do not fall into traditional definitions of "attractiveness," including women of color, are isolated or made to feel invisible to the powers that be.
- Lesbians who are open about their orientation face isolation and harassment.

- Any woman who refuses the advances of men runs the risk of being pushed to "prove" her orientation.
- Women's research is sometimes plagiarized or stolen. In 1988, an AMWA member's research article was stolen by a superior; she was later fired and ostracized for protesting the plagiarism. Although a Federal appeals court supported her plagiarism claim, the male superior has been promoted to a senior position, while the woman researcher is still unemployed. {31}
- Women subordinates often do not receive credit for their contributions. Many principal investigators of research grants are men, but much of the research work is often performed by lower level female research assistants; these women are at a significant disadvantage in protesting inequitable treatment.
- Use of forced psychotherapy and forced psychiatric examinations as tools of sexual harassment and as retaliation against women for complaining about harassment is illegal and unethical but all too widespread.
- The dominating style in the scientific workplace is that of men: combative, accompanied by insults and yelling.
- In interviews, women are asked about family plans three times as often as men are asked.

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***"...snickering, giggling, and generally rude commentary occur any and every time there is a discussion of female reproductive organs."***
***–Medical Student***

***"One woman candidate who thought that her infertility would preclude questions prying into goals regarding family life was nevertheless interrogated regarding possible plans for adoption."***
***–Medical Student***

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***Issue 6 Recommendations***

In order to create a professional environment free of gender inequities of any kind, issues of sex discrimination and sexual harassment must be defined, then confronted through policies at all levels. A number of recommendations were made.

- Document the psychological sequelae of discrimination and its impact on employees and institutions.
- Conduct national surveys to document the problem.
- Identify ways in which women can cope effectively.
- Increase nationwide public awareness of the problem through education.
- Require author anonymity in the scientific review process as a means of countering the prejudice against women.
- Develop mechanisms to assure proper credit to research, including a fair hearings appeal process.
- Require medical and graduate school administrators to make clear to students and faculty alike that personal and professional sexism will not be tolerated.
- Develop and enforce sexual harassment policies with prevention and education programs on all campuses.
- Incorporate attitudinal as well as substantive change in curriculum reform regarding gender sensitivity.
- Sensitize faculty and research mentors to the differences in learning and communication styles between men and women.
- Develop arbitration as a possible alternative to lengthy and expensive litigation for tenure appeals and sex discrimination appeals.

## Issue 7:
## Research Initiatives on Women's Health

*Barriers*

The lack of a medical and research specialty in women's health was discussed. More women might be attracted to biomedical careers if a specialty focusing on women were available. Even giving more emphasis to women's health in existing programs might attract women to the career field.

*Issue 7 Recommendations*

- Emphasize women's health in the education of all health professionals.
- Develop programs specific to women's health in existing health training programs.
- Develop a continuing education program on women's health for physicians in all specialties.
- Offer residency and fellowship programs in women's health.
- Develop a curriculum for a medical specialty in women's health.

## Issue 8:
## Gender Sensitivity

*Barriers*

Insensitivity to the differences between women and men is a major barrier to compatible working relationships. The style of men tends to be hierarchical, noncollaborative, competitive, combative, and noncommunicative.

*Issue 8 Recommendations*

The following recommendations were offered as approaches to creating a workplace attitude more compatible to women.

- Offer seminars to men to broaden their scope in the following areas: team building, creative thinking, ethnic diversity, gender awareness, and communication skills.
- Foster collaborative and synergistic research.
- Promote nonhierarchical research teams.

## Issue 9:
## Minority Women in Science

### *Barriers*

All the issues that apply to women in general take on a special intensity for minority women. Barriers to academic achievement, access, equity, excellence in education curricula, academic services, financial assistance, and the scarcity of mentors/role models have kept Hispanics, other minorities, and women out of academe.

Given the widespread concern of a glass ceiling for women in biomedical research careers, the predicament for under-represented minority women is so dreary, that for the most part, such a concern is totally abstract. For the overwhelming majority of minority women, careers in biomedical research appear unrealistic and out of reach, let alone worrying about the possibility of a glass ceiling. Although the number of minority women enrolled in medical schools has increased, and at the same rate as women overall (Association of American Medical Colleges, 1989), the number of minority women in biomedical research careers and medical faculty positions is negligible. {6}

***"For many minority women, to be in a position where a glass ceiling comes into effect would be a drastic improvement." {6}***

A key element to improved health care for minorities is inclusion of researchers who understand the culture, language, and community mores. Yet opportunities for such researchers and research are diminishing. Since 1961, 57 black hospitals have closed, 14 have merged, and only 12 remain. These hospitals are needed for specialized training. {2}

In 1980, the percentage of women physicians in the United States was only 13.4 percent. Of the total of female physicians, only 0.6 percent were Hispanic women. The most recent data (1991) for multiple ethnicity groups are presented in the two tables below.

Minority women and girls still face race-based stereotypical attitudes, in addition to gender stereotyping. For example, young minority women tend to be neglected or are less likely to be taken seriously in career counseling.

### *Issue 9 Recommendations*

Special attention to minority women in all programs was recommended, with the following specific suggestions.

- In conducting research, ask different questions to determine race, sex, and socioeconomic factors.
- Allocate resources to provide one-to-one, face-to-face recruitment, particularly of minorities, into graduate, science-related programs.
- Provide incentives for schools to develop and retain very diverse student populations (disadvantaged/advantaged, rural/urban, minority/majority).
- Aim research initiatives at minority women's health issues.
- Prepare Asian-American nurses to assume greater responsibility in management positions in health-care institutions.

## Distribution of U.S. Medical School Faculty by Sex, Ethnicity and Degree

| | MD | | PhD/OHD* | | MD-PhD/MD-OHD* | | Other | |
|---|---|---|---|---|---|---|---|---|
| Male | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Native American | 37 | 0.1 | 7 | 0.0 | 2 | 0.1 | 1 | 0.0 |
| Asian | 1,942 | 4.8 | 1,274 | 7.1 | 380 | 10.5 | 121 | 3.0 |
| Black | 610 | 1.5 | 143 | 0.8 | 36 | 1.0 | 98 | 2.4 |
| Mexican American | 100 | 0.2 | 31 | 0.2 | 6 | 0.2 | 2 | 0.0 |
| Puerto Rican | 261 | 0.7 | 33 | 0.2 | 6 | 0.2 | 8 | 0.2 |
| Other Hispanic | 603 | 1.5 | 121 | 0.7 | 64 | 1.8 | 35 | 0.9 |
| White | 27,239 | 67.8 | 11,444 | 63.4 | 2,602 | 72.1 | 1,275 | 31.6 |
| Refused | 985 | 2.5 | 515 | 2.9 | 100 | 2.8 | 50 | 1.2 |
| Missing | 877 | 2.2 | 278 | 1.5 | 45 | 1.2 | 341 | 8.4 |
| **Subtotal** | **32,654** | **81.3** | **13,846** | **76.7** | **3,241** | **89.8** | **1,931** | **47.8** |
| Female | | | | | | | | |
| Native American | 5 | 0.0 | 7 | 0.0 | 1 | 0.0 | 4 | 0.1 |
| Asian | 803 | 2.0 | 320 | 1.8 | 68 | 1.9 | 90 | 2.2 |
| Black | 313 | 0.8 | 62 | 0.3 | 4 | 0.1 | 108 | 2.7 |
| Mexican American | 30 | 0.1 | 9 | 0.0 | 0 | 0.0 | 5 | 0.1 |
| Puerto Rican | 116 | 0.3 | 22 | 0.1 | 0 | 0.0 | 15 | 0.4 |
| Other Hispanic | 118 | 0.3 | 48 | 0.3 | 2 | 0.1 | 38 | 0.9 |
| White | 5,545 | 13.8 | 3,478 | 19.3 | 271 | 7.5 | 1,657 | 41.0 |
| Refused | 212 | 0.5 | 135 | 0.7 | 10 | 0.3 | 36 | 0.9 |
| Missing | 351 | 0.9 | 122 | 0.7 | 13 | 0.4 | 153 | 3.8 |
| **Subtotal** | **7,493** | **18.7** | **4,203** | **23.3** | **369** | **10.2** | **2,106** | **52.2** |
| **TOTAL** | **40,147** | **100.0** | **18,049** | **100.0** | **3,610** | **100.0** | **4,037** | **100.0** |

*OHD - Other Health Doctorate

Source: Association of American Medical Colleges (AAMC). *U.S. Medical School Faculty 1991*, Faculty Roster System, Washington, DC: AAMC, 1991.

## PARTICIPANTS

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    League of United Latin American Citizens
13. Janet L. Walker, M.D.
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14. Tina Settineri
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15. Dorothy A. Starr, M.D.
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18. Anne Morris-Hooke, Ph.D.
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    American Society for Microbiology
19. Shelby Rush
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20. Erin E. Tracy
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21. M. Maureen Polsby, M.D.
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23. Suzanne G. Haynes, Ph.D.
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24. Maria Bustillo, M.D.
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25. Muriel M. Lippman, Ph.D.
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26. Catherine Morrison
    President
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27. Evelyne J.Warrick
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    Lynne Warrick Enterprises, Inc.

28. Sharon L. Johnson, Ph.D.
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29. Billie B. Mackey
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30. Edward C. Connors
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31. Lillian Gonzalez-Pardo, M.D.
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32. Roger J. Bulger, M.D.
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33. Donald R. Mattison, M.D.
    Dean
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34. Maria Lourdes Garcia
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35. René Rodriguez, M.D.
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36. Congresswoman Maxine Waters (D-CA)
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37. Ruth A. Anderson, D.D.S.
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38. Martha Cortés, D.D.S.
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40. Susan Morris Shaffer, M.Ed.
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61. William H. McBeath, M.D., M.P.H.
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62. Eleanor Smeal
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Penelope Coates, Ph.D.
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and

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APPENDIX 5

# On-Line Access

## On-Line Access

WISENET/Midwest will provide a means for Midwestern women scientists and engineers to meet like-minded people, swap experiences, and share information.

***What Is LISTSERV?***
LISTSERV is software that runs in the VM operating system at many universities. It provides the function of keeping subscription lists and forwarding mail to the subscribers.

***Where Is LISTSERV for WISENET?***
The LISTSERV running in the 3090 mainframe computer at the Academic Computer Center of the University of Illinois at Chicago maintains the subscription list for WISENET.

***How Can I Subscribe to WISENET?***
Send a SUBSCRIBE command to the LISTSERV, telling it you want to subscribe to WISENET. The way to send the command will vary a little, depending on the operating system in the computer where you have your mail account.

The command is:
SUBSCRIBE WISENET *yourname*
for example, SUBSCRIBE WISENET Ellen Smith
If you are using the VM operating system and on the Bitnet network, you may enter
TELL LISTSERV AT UICVM SUBSCRIBE WISENET *yourname*

Or send mail, using your mail commands to create it.
Send the mail to LISTSERV AT UICVM
(if you are on Bitnet)
or to LISTSERV@uicvm.uic.edu
(if on Internet)

Put a single line in the mail saying:
SUBSCRIBE WISENET *yourname*

***How Do I Get Mail From WISENET?***
Once you are subscribed, LISTSERV will forward a copy of all the WISENET mail to you.

***How Do I Send Mail to WISENET?***
Address mail to WISENET at UICVM
(if your system is on Bitnet)
or to WISENET@uicvm.uic.edu
(if on Internet)

***How Do I Find Out What "Net" I'm On?***
If you're not sure, you can find out from your system administrator. If your own electronic mail address resembles either of the ones above, that is an indication of the net you are on. If you need more assistance: contact the Center for Research on Women and Gender at (312) 413-1924 or send electronic mail to U35049 at UICVM (Internet: U35049@uicvm.uic.edu).

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